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Resource Bulletin
NC - 190

Pulpwood Production in the North-Central Region, 1996

Ronald J. Piva

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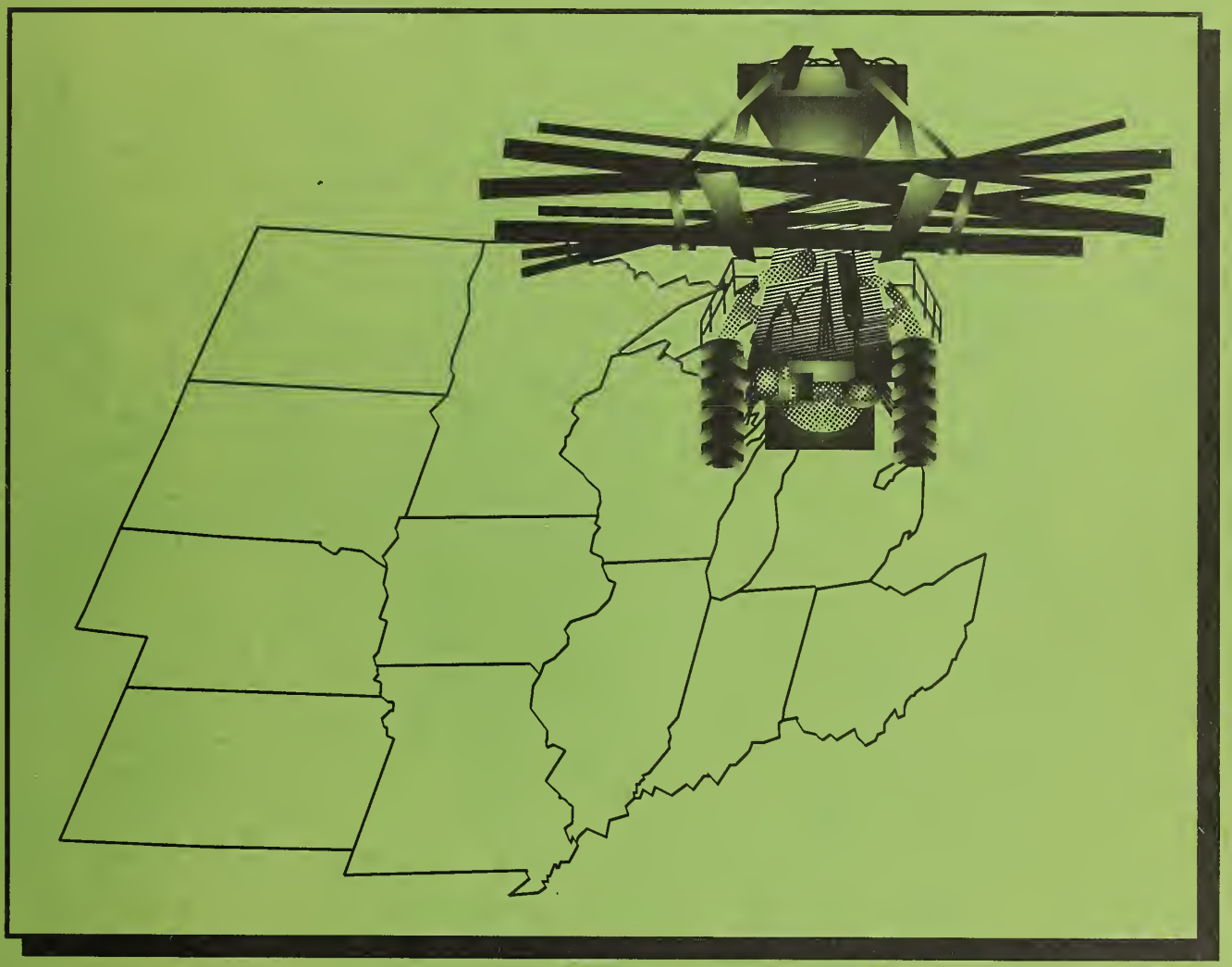

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Pulpwood Production in the North-Central Region, 1996

Ronald J. Piva

NOTE: This report includes all primary products made from reconstituted wood fiber. In addition to wood pulp, this includes particleboard and engineered lumber products[1] made from chips, shavings, wafers, flakes, strands, and sawdust. This report presents the production by county of the raw fiber material delivered to mills. Thus, these data report only that portion of the timber harvest used as raw material and do not necessarily reflect the volume of growing stock harvested.

Pulpwood constitutes more than half the industrial timber products harvested annually in the Lake States (Michigan, Minnesota, and Wisconsin) and is an important product in the Central States (Illinois, Indiana, Iowa, and Missouri) and the Plains States (Kansas, Nebraska, North Dakota, and South Dakota).

Current detailed information about pulpwood production[2] is necessary for intelligent planning and decision making in wood procurement, forest resource management, forest industry development, and scientific studies.

Since 1979, we have included logs, bolts, and wood residue used in manufacturing flake board, wafer board, oriented strand board, and medium density fiberboard in this annual report. Engineered lumber was included in this report in 1992. Together, these products are called particleboards, and all mills manufacturing these boards will be called particleboard mills in this paper. Wood used at particleboard mills is identical or nearly identical to wood used at pulp mills; therefore, including this wood in our study provides a more accurate estimate of demand for pulpwood-like material.

Ronald J. Piva, Forester, received a B.S. degree in forest management from the University of Missouri-Columbia. He joined the Forest Service in 1987, and has been working with the North Central Station's Forest Inventory and Analysis unit since.

Particleboard mills were in their infancy before 1979 and used primarily aspen and wood residue. Therefore, data for these mills do not distort roundwood use trends for other species or preclude comparing 1996 survey results with those of 1978 and previous years.

Pulp and particleboard mills using North Central States timber in 1996 reported their pulpwood receipts[3] by species group and county of origin. This report presents the results of the survey, analyzes the data, compares results with those of 1995 or earlier years, and discusses trends in pulpwood production and use.

The Lake States, Central States, and Plains States are discussed separately because the timber types in each area are different, the flow of wood between the areas is nominal, and more detailed data on pulpwood production and receipts in the Central and Plains States might reveal the operations of individual mills. This is the 38th annual report of the pulpwood harvest in Lake States counties, the 37th annual report of the Central States harvest, and the 4th report of the pulpwood harvest in the Plains States.

Several mills purchase their pulpwood based on weight rather than volume. Conversion factors to convert green tons of pulpwood to standard cord equivalents are shown in the Appendix.

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[1] *U.S. Forest Products Laboratory. 1974. Wood handbook: wood as an engineering material. Agric. Handb. 72. Washington, DC: U.S. Department of Agriculture, Forest Service: 23-27. (revised)*

[2] *Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut, plus the annual wood residue volume produced by sawmills, veneer mills, etc. used for pulp, particleboard, wafer board, oriented strand board, medium density fiberboard, or engineered lumber.*

[3] *Pulpwood receipts are the volume of wood received by mills in a specific State or region, regardless of the geographic source.*

LAKE STATES

PRODUCTION

- Pulpwood production as a whole decreased to 9.5 million cords[4] in 1996 from 9.6 million cords in 1995, a fall of 1 percent (table 1). Of each cord produced, 91 percent came from roundwood (including chips from roundwood) and 9 percent came from the residue[5] of wood-using plants (fig. 1).

- Hardwoods constituted 76 percent of the total pulpwood production.

- Principal species of roundwood harvested in 1996 were aspen (4.1 million cords), jack pine (661 thousand cords), hard maple (641 thousand cords), white birch (541 thousand cords), and soft maple (524 thousand cords).

- Aspen remained the dominant species of pulpwood roundwood harvested—49 percent.

- Softwood roundwood production increased by 162 thousand cords, or 9 percent, in 1996. Pulpwood production from softwood residue rose to 14 thousand cords, a 7-percent gain from the previous year (fig. 2).

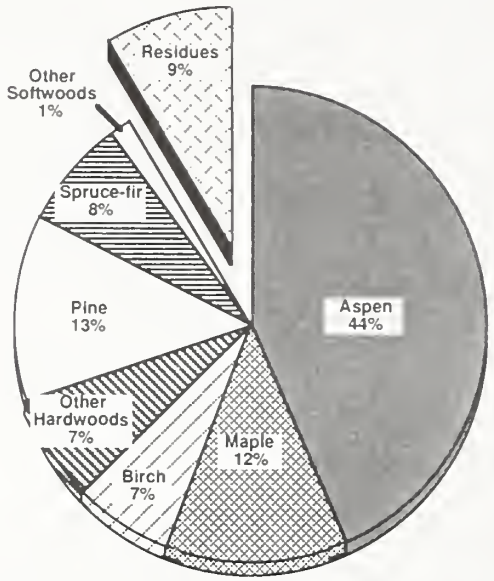


Figure 1.—*Lake States pulpwood production by species group and residues, 1996.*

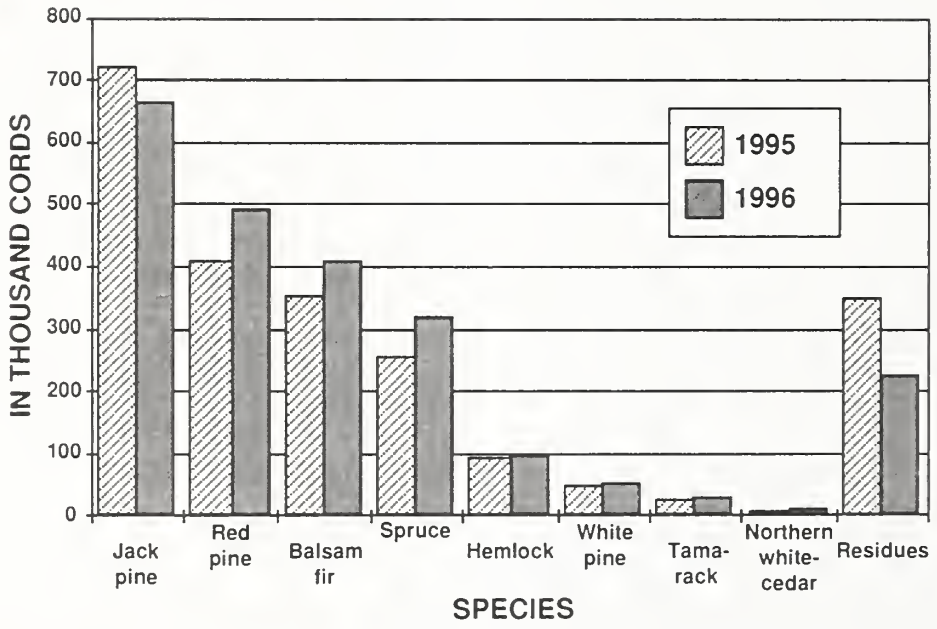


Figure 2.—*Softwood pulpwood production in the Lake States, 1995-1996.*

[4]*All references to cords are in standard cords. A standard cord is 128 cubic feet of wood, bark, and air space.*

[5]*Residue is the byproduct from sawmills, veneer mills, cooperage mills, and other wood-using mills that is used for pulping and particleboard. Residue includes slabs, edgings, veneer cores, sawdust, fines, woodflour, and chips manufactured from slabs, edgings, and veneer cores.*

Table 1.—Production and imports of pulpwood, Lake States, 1996[1]

(In standard cords, unpeeled)

Product form, species group, and destination	Production by State[2]			Regional total	Imports				Total imports	Total receipts
	Michigan	Minnesota	Wisconsin		Central States	Plains States	Other U.S.[3]	Canada		
Roundwood										
N. white-cedar										
Michigan	8,214	--	427	8,640	--	--	--	15	15	8,655
Total	8,214	--	427	8,640	--	--	--	15	15	8,655
Balsam fir										
Canada	6,564	--	--	6,564	--	--	--	--	--	--
Michigan	43,762	--	2,218	45,980	--	--	--	77	77	46,057
Minnesota	3,856	191,999	16,638	212,494	--	--	--	657	657	213,151
Wisconsin	11,262	60,459	73,172	144,893	--	--	--	657	657	145,550
Total	65,444	252,458	92,028	409,931	--	--	--	1,392	1,392	404,759
Hemlock										
Michigan	68,367	--	6,671	75,037	--	--	--	134	134	75,172
Wisconsin	2,569	--	18,513	21,082	--	--	--	--	--	21,082
Total	70,936	--	25,184	96,120	--	--	--	134	134	96,254
Jack pine										
Michigan	207,824	--	11,545	219,369	--	--	--	140	140	219,509
Minnesota	--	39,421	3,514	42,935	--	--	--	--	--	42,935
Wisconsin	42,092	19,737	337,111	398,940	24	--	--	--	24	398,964
Total	249,916	59,158	352,170	661,244	24	--	--	140	164	661,408
Red pine										
Michigan	86,304	--	7,752	94,056	--	--	--	111	111	94,167
Minnesota	--	38,710	6,389	45,099	--	--	--	--	--	45,099
Wisconsin	29,297	19,824	302,155	351,275	1,815	--	--	--	1,815	353,089
Total	115,601	58,534	316,296	490,431	1,815	--	--	111	1,925	492,356
White pine										
Michigan	6,216	--	290	6,506	--	--	--	10	10	6,516
Minnesota	--	635	224	859	--	--	--	--	--	859
Wisconsin	1,203	183	42,905	44,291	--	--	--	--	--	44,291
Total	7,418	819	43,419	51,656	--	--	--	10	10	51,666
Spruce										
Canada	11,718	--	--	11,718	--	--	--	--	--	--
Michigan	19,579	--	921	20,500	--	--	--	30	30	20,530
Minnesota	--	103,636	2,979	106,614	--	--	--	1,332	1,332	107,947
Wisconsin	46,231	100,500	32,723	179,454	--	--	--	9,107	9,107	188,561
Total	77,527	204,136	36,623	318,286	--	--	--	10,469	10,469	317,037
Tamarack										
Michigan	5,708	--	309	6,017	--	--	--	9	9	6,025
Minnesota	--	2,540	--	2,540	--	--	--	--	--	2,540
Wisconsin	441	10,935	9,889	21,264	--	--	--	--	--	21,264
Total	6,149	13,474	10,197	29,821	--	--	--	9	9	29,830
Total softwood roundwood										
Canada	18,282	--	--	18,282	--	--	--	--	--	--
Michigan	445,973	--	30,133	476,106	--	--	--	525	525	476,631
Minnesota	3,856	376,941	29,744	410,541	--	--	--	1,990	1,990	412,531
Wisconsin	133,094	211,638	816,468	1,161,200	1,839	--	--	9,764	11,602	1,172,803
Total	601,206	588,579	876,345	2,066,130	1,839	--	--	12,278	14,117	2,061,965
Residues										
Softwood										
Canada	4,878	12,041	585	17,504	--	--	--	--	--	--
Michigan	79,465	--	10,646	90,110	--	--	--	466	466	90,577
Minnesota	--	49,966	1,309	51,275	--	--	--	795	795	52,070
Wisconsin	2,327	719	62,246	65,292	--	47,118	45,137	12,059	104,314	169,606
Other[4]	1,487	--	--	1,487	--	--	--	--	--	--
Total	88,157	62,726	74,785	225,668	--	47,118	45,137	13,321	105,576	312,253
Total all softwood material										
Canada	23,160	12,041	585	35,786	--	--	--	--	--	--
Michigan	525,438	--	40,779	566,216	--	--	--	991	991	567,208
Minnesota	3,856	426,907	31,052	461,816	--	--	--	2,785	2,785	464,601
Wisconsin	135,422	212,357	878,714	1,226,492	1,839	47,118	45,137	21,823	115,917	1,342,409
Other[4]	1,487	--	--	1,487	--	--	--	--	--	--
Total	689,362	651,306	951,130	2,291,798	1,839	47,118	45,137	25,599	119,693	2,374,218

(Table 1 continued on next page)

(Table 1 continued)

Product form, species group, and destination	Production by State[2]			Regional total	Imports				Total imports	Total receipts
	Michigan	Minnesota	Wisconsin		Central States	Plains States	Other U.S.[3]	Canada		
Roundwood										
Ash										
Michigan	37,511	--	6,946	44,457	--	--	--	2	2	44,459
Minnesota	--	885	--	885	--	--	--	--	--	885
Wisconsin	2,695	824	69,695	73,214	--	--	--	--	--	73,214
Total	40,206	1,709	76,641	118,556	--	--	--	2	2	118,558
Aspen										
Michigan	824,672	--	45,455	870,127	--	--	--	53,204	53,204	923,331
Minnesota	1,196	2,009,656	27,449	2,038,300	--	2,322	--	117,848	120,170	2,158,470
Wisconsin	87,244	88,679	1,036,316	1,212,240	--	--	--	6,209	6,209	1,218,449
Total	913,112	2,098,335	1,109,221	4,120,667	--	2,322	--	177,262	179,583	4,300,250
Balsam poplar										
Michigan	58,214	--	5,216	63,429	--	--	--	3	3	63,432
Minnesota	--	88,547	45	88,592	--	9	--	14,256	14,265	102,857
Wisconsin	65	1,548	1,098	2,711	--	--	--	--	--	2,711
Total	58,279	90,095	6,358	154,732	--	9	--	14,259	14,268	169,000
Basswood										
Michigan	67,012	--	9,486	76,498	--	--	--	1	1	76,499
Wisconsin	3,237	12	41,313	44,563	--	--	--	--	--	44,563
Total	70,249	12	50,800	121,061	--	--	--	1	1	121,062
Beech										
Michigan	12,561	--	171	12,733	--	--	--	8	8	12,741
Wisconsin	--	--	805	805	--	--	--	--	--	805
Total	12,561	--	976	13,538	--	--	--	8	8	13,546
White birch										
Michigan	175,089	--	43,322	218,411	--	--	--	838	838	219,248
Minnesota	--	71,188	2,273	73,460	--	--	--	10	10	73,470
Wisconsin	6,493	38,224	204,153	248,870	--	--	--	1,773	1,773	250,643
Total	181,582	109,412	249,747	540,741	--	--	--	2,621	2,621	543,361
Yellow birch										
Michigan	74,029	--	10,812	84,842	--	--	--	23	23	84,864
Wisconsin	548	--	14,489	15,037	--	--	--	--	--	15,037
Total	74,577	--	25,302	99,879	--	--	--	23	23	99,902
Cottonwood										
Michigan	172	--	--	172	--	--	--	--	--	172
Wisconsin	65	--	1,086	1,151	--	--	--	--	--	1,151
Total	237	--	1,086	1,323	--	--	--	--	--	1,323
Elm										
Michigan	503	--	6	509	--	--	--	1	1	510
Wisconsin	131	--	26,621	26,752	--	--	--	--	--	26,752
Total	633	--	26,627	27,260	--	--	--	1	1	27,261
Hickory										
Wisconsin	--	--	643	643	--	--	--	--	--	643
Total	--	--	643	643	--	--	--	--	--	643
Hard maple										
Michigan	416,736	--	19,548	436,283	--	--	--	2,066	2,066	438,349
Minnesota	--	2,875	1,023	3,898	--	--	--	--	--	3,898
Wisconsin	7,109	2,005	191,449	200,562	--	--	--	--	--	200,562
Total	423,844	4,880	212,019	640,744	--	--	--	2,066	2,066	642,809
Soft maple										
Michigan	348,203	--	12,775	360,978	--	--	--	990	990	361,968
Minnesota	--	3,104	1,155	4,259	--	--	--	--	--	4,259
Wisconsin	4,833	717	153,211	158,760	--	--	--	--	--	158,760
Total	353,036	3,821	167,141	523,998	--	--	--	990	990	524,987
Red oak										
Michigan	58,380	--	10,572	68,952	--	--	--	--	--	68,952
Wisconsin	2,129	74	98,667	100,870	--	--	--	--	--	100,870
Total	60,509	74	109,239	169,822	--	--	--	--	--	169,822
White oak										
Michigan	25,020	--	--	25,020	--	--	--	--	--	25,020
Wisconsin	670	3	25,130	25,803	--	--	--	--	--	25,803
Total	25,690	3	25,130	50,822	--	--	--	--	--	50,822
Other hardwoods										
Michigan	17,941	--	638	18,579	--	--	--	--	--	18,579
Wisconsin	338	12	7,498	7,847	--	--	--	--	--	7,847
Total	18,279	12	8,135	26,426	--	--	--	--	--	26,426

(Table 1 continued on next page)

(Table 1 continued)

Product form, species group, and destination	Production by State[2]			Regional total	Imports				Total imports	Total receipts
	Michigan	Minnesota	Wisconsin		Central States	Plains States	Other U.S.[3]	Canada		
Total hardwood roundwood										
Michigan	2,116,041	--	164,947	2,280,988	--	--	--	57,136	57,136	2,338,124
Minnesota	1,196	2,176,255	31,943	2,209,395	--	2,331	--	132,114	134,445	2,343,840
Wisconsin	115,556	132,098	1,872,173	2,119,827	--	--	--	7,982	7,982	2,127,809
Total	2,232,793	2,308,353	2,069,064	6,610,210	--	2,331	--	197,232	199,563	6,809,773
Residues										
Hardwood										
Canada	--	25,464	--	25,464	--	--	--	--	--	--
Michigan	173,363	--	12,402	185,766	12,638	--	--	802	13,440	199,206
Minnesota	--	72,727	4,879	77,606	--	--	--	49	49	77,654
Wisconsin	15,942	7,302	269,468	292,712	1,158	--	--	--	1,158	293,870
Other[4]	--	--	2,318	2,318	--	--	--	--	--	--
Total	189,305	105,493	289,066	583,865	13,796	--	--	851	14,647	570,730
Total all hardwood material										
Canada	--	25,464	--	25,464	--	--	--	--	--	--
Michigan	2,289,404	--	177,350	2,466,754	12,638	--	--	57,938	70,576	2,537,330
Minnesota	1,196	2,248,982	36,822	2,287,000	--	2,331	--	132,163	134,494	2,421,494
Wisconsin	131,498	139,400	2,141,641	2,412,539	1,158	--	--	7,982	9,140	2,421,679
Other[4]	--	--	2,318	2,318	--	--	--	--	--	--
Total	2,422,098	2,413,846	2,358,131	7,194,075	13,796	2,331	--	198,083	214,210	7,380,503
Total all roundwood										
Canada	18,282	--	--	18,282	--	--	--	--	--	--
Michigan	2,562,014	--	195,080	2,757,094	--	--	--	57,661	57,661	2,814,755
Minnesota	5,052	2,553,197	61,687	2,619,936	--	2,331	--	134,104	136,435	2,756,371
Wisconsin	248,651	343,736	2,688,641	3,281,028	1,839	--	--	17,746	19,585	3,300,612
Total	2,833,999	2,896,932	2,945,409	8,676,340	1,839	2,331	--	209,510	213,680	8,871,738
Total all residues										
Canada	4,878	37,505	585	42,969	--	--	--	--	--	--
Michigan	252,828	--	23,048	275,876	12,638	--	--	1,268	13,907	289,783
Minnesota	--	122,693	6,187	128,880	--	--	--	844	844	129,724
Wisconsin	18,269	8,021	331,713	358,004	1,158	47,118	45,137	12,059	105,472	463,476
Other[4]	1,487	--	2,318	3,805	--	--	--	--	--	--
Total	277,462	168,219	363,852	809,533	13,796	47,118	45,137	14,172	120,223	882,983
Total all wood material										
Canada	23,160	37,505	585	61,251	--	--	--	--	--	--
Michigan	2,814,842	--	218,128	3,032,970	12,638	--	--	58,929	71,567	3,104,538
Minnesota	5,052	2,675,890	67,874	2,748,816	--	2,331	--	134,948	137,279	2,886,095
Wisconsin	266,920	351,757	3,020,355	3,639,031	2,997	47,118	45,137	29,805	125,057	3,764,088
Other[4]	1,487	--	2,318	3,805	--	--	--	--	--	--
Total	3,111,461	3,065,152	3,309,261	9,485,873	15,635	49,449	45,137	223,682	333,903	9,754,721

[1] Table may not add due to rounding.

[2] Vertical columns of figures under the box heading "Production by State" present the amount of roundwood cut or residue generated in each State.

[3] Mostly Western States.

[4] Pulpwood shipped to mills outside of region.

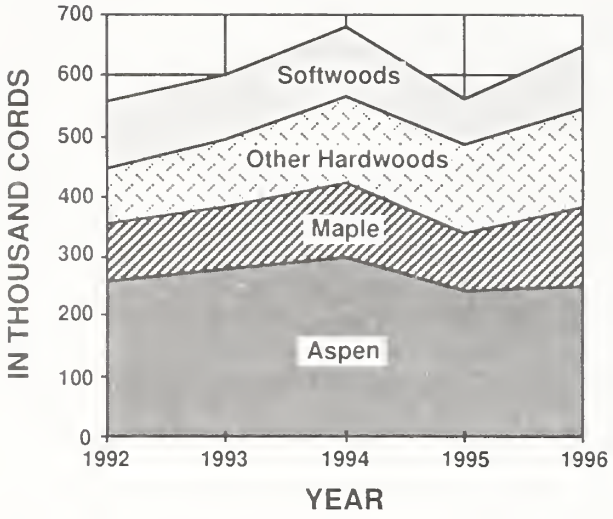


Figure 3.—*Whole-tree chip production in the Lake States, 1992-1996.*

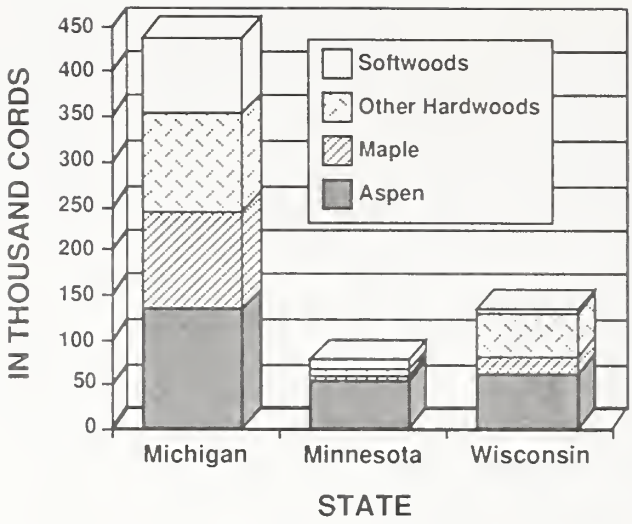


Figure 4.—*Whole-tree chip production by State in the Lake States, 1996.*

- Whole-tree chip[6] (WTC) production, which makes up 7 percent of the total pulpwood production in the Lake States, increased by 15 percent to 649 thousand cords in 1996. Softwood WTC production increased by 28 percent and hardwood WTC production increased by 13 percent (fig. 3).

- Michigan was the major producer of WTC in the Lake States in 1996 with 439 thousand cords (68 percent of the WTC production) (fig. 4).

- Aspen was the predominant species used in WTC in 1996 with 250 thousand cords, 39 percent of the total WTC production.

- Jack pine was the predominant softwood species used in WTC in 1996, making up 82 percent of the softwood WTC production and 13 percent of the total WTC production.

Michigan

- Michigan pulpwood production remained at 3.1 million cords in 1996 (fig. 5).

- In 1996, hardwoods accounted for 78 percent of Michigan's pulpwood production.

- Roundwood production for pulpwood in 1996 was 2.8 million cords, only 400 cords less than in 1995 (fig. 6).

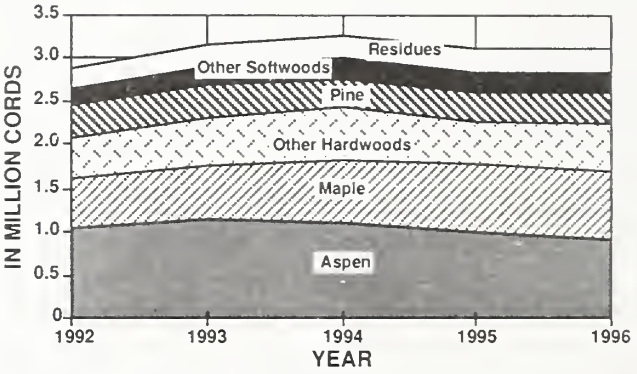


Figure 5.—*Michigan pulpwood production by species group and residues, 1992-1996.*

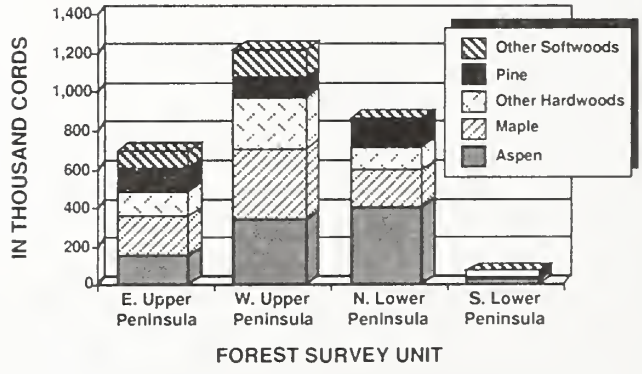


Figure 6.—*Michigan roundwood pulpwood production by Forest Survey Unit and species groups, 1996.*

[6]*Pulpwood produced from chipping entire trees (all portions of the trees above ground, except the stumps).*

- The Western Upper Peninsula was the top producing region in the State in 1996 with 43 percent of the roundwood harvested.

- Marquette County in the Western Upper Peninsula was the top producer of roundwood in the State with 295 thousand cords.

- Roundwood pulpwood production in 1996 increased by 6 percent in the Western Upper Peninsula, increased by 2 percent in the Northern Lower Peninsula, remained the same in the Southern Lower Peninsula, and decreased by 11 percent in the Eastern Upper Peninsula.

Minnesota

- Pulpwood production increased by 3 percent to 3.1 million cords in 1996 (fig. 7).

- Hardwoods accounted for 79 percent of the total pulpwood produced in 1996.

- Ninety-five percent of the pulpwood produced came from roundwood.

- The Aspen-Birch and the Northern Pine Units were the top roundwood pulpwood producing areas in the State in 1996 with 1.3 million cords and 1.2 million cords, respectively (fig. 8).

- St. Louis County, in the Aspen-Birch Unit, remained the top producing county with 637 thousand cords, a 6-percent increase from the previous year.

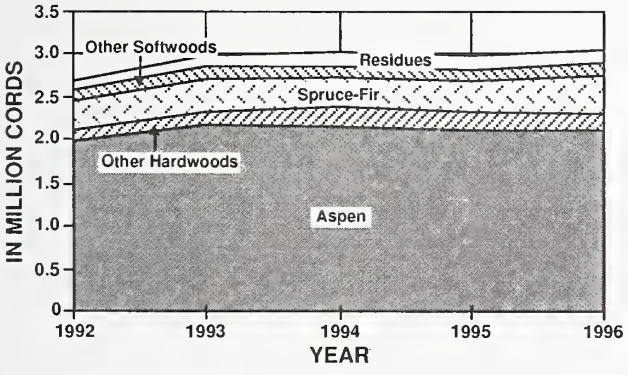


Figure 7.—*Minnesota pulpwood production by species group and residues, 1992-1996.*

- Aspen pulpwood production continued its decrease for the third straight year, falling 5 thousand cords in 1996 to 2.1 million cords. Aspen accounted for 72 percent of the roundwood harvested.

- Pulpwood production from hardwood residues increased by 7 percent to 105 thousand cords in 1996.

Wisconsin

- Pulpwood production in Wisconsin decreased by 5 percent in 1996, falling to 3.3 million cords (fig. 9).

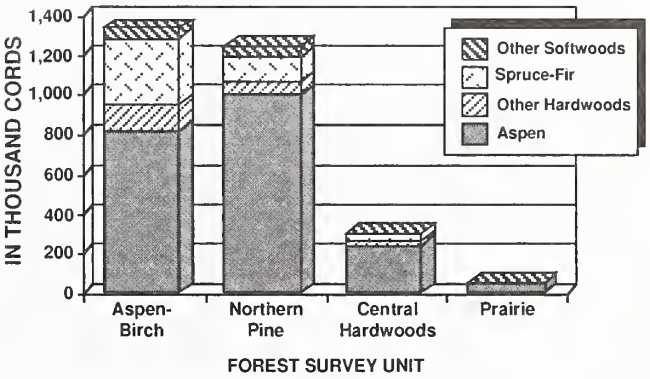


Figure 8.—*Minnesota roundwood pulpwood production by Forest Survey Unit and species group, 1996.*

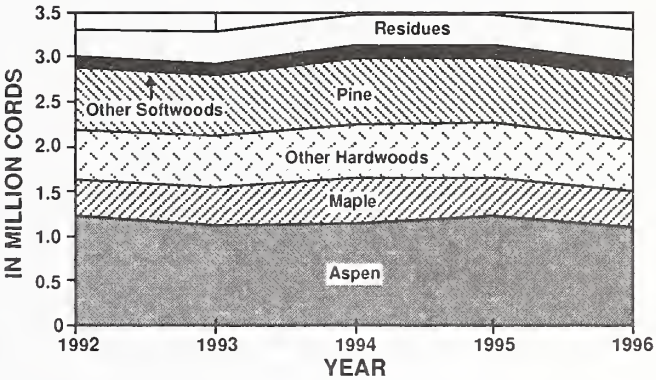


Figure 9.—*Wisconsin pulpwood production by species group and residues, 1992-1996.*

- Roundwood accounted for 89 percent of the pulpwood produced in 1996.

- The Northwest and Northeast Units were the top producers of roundwood for pulping in Wisconsin in 1996 with 1.2 million cords and 1.0 million cords, respectively (fig. 10).

- Douglas County in the Northwest Unit remained the top pulpwood producing county in the State with 184 thousand cords.

- Aspen harvests decreased by 9 percent to 1.1 million cords in 1996.

- Pine roundwood production for pulpwood accounted for 24 percent of the total harvest.

Harvesting Intensity

- In this report, we show the distribution of the harvest in two ways: first, the amount of pulpwood cut relative to the growing-stock volume in each of five major pulpwood species (fig. 11); and second, the amount of pulpwood relative to commercial timberland area (fig. 12).

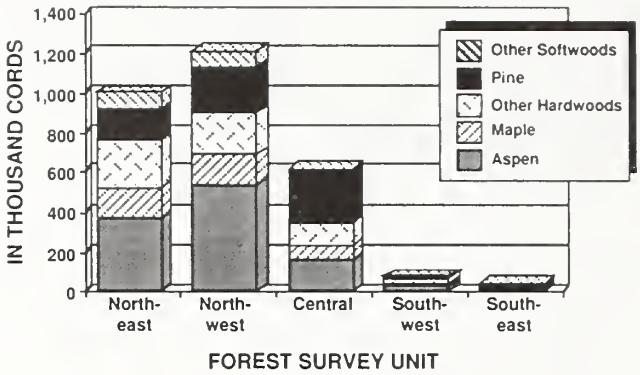


Figure 10.—*Wisconsin roundwood pulpwood production by Forest Survey Unit and species group, 1996.*

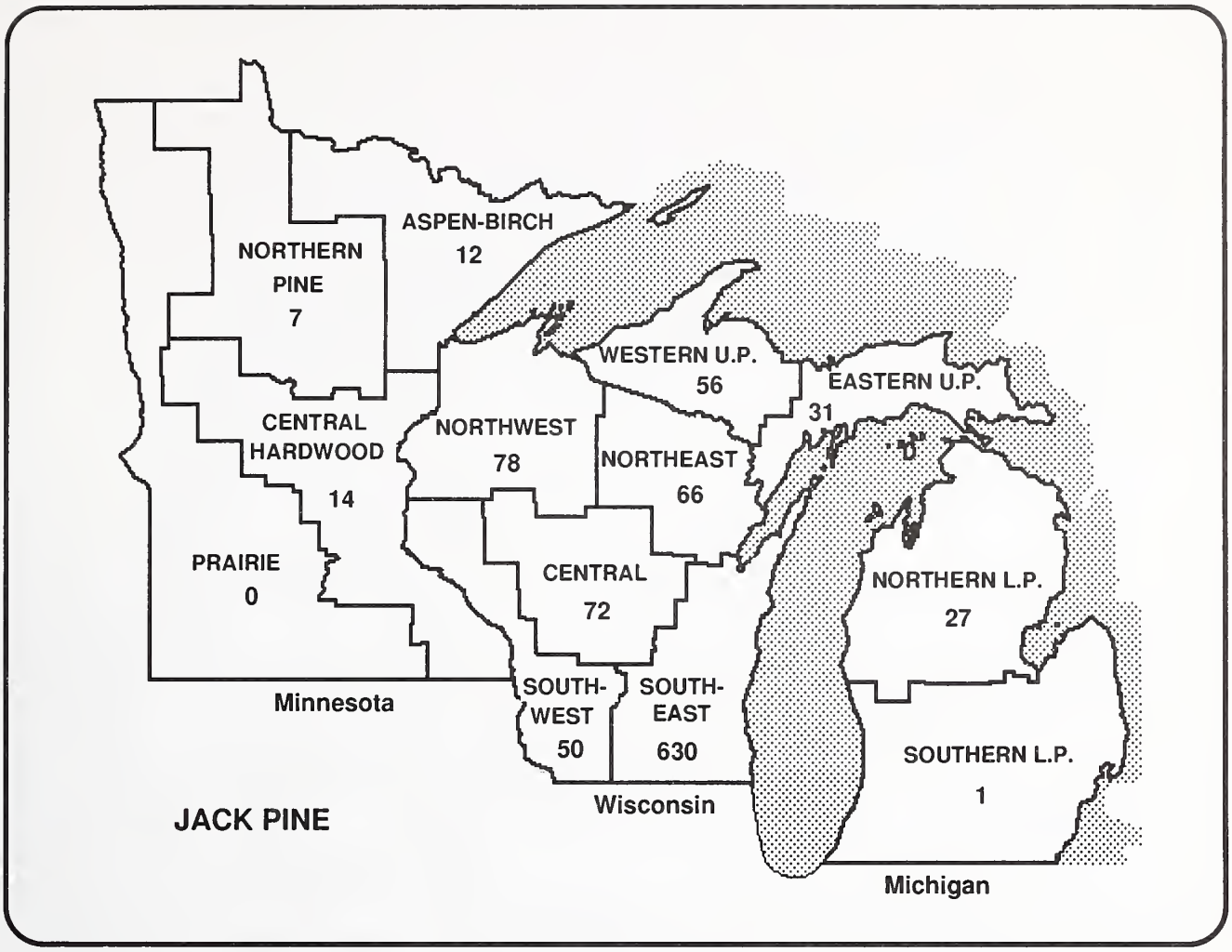
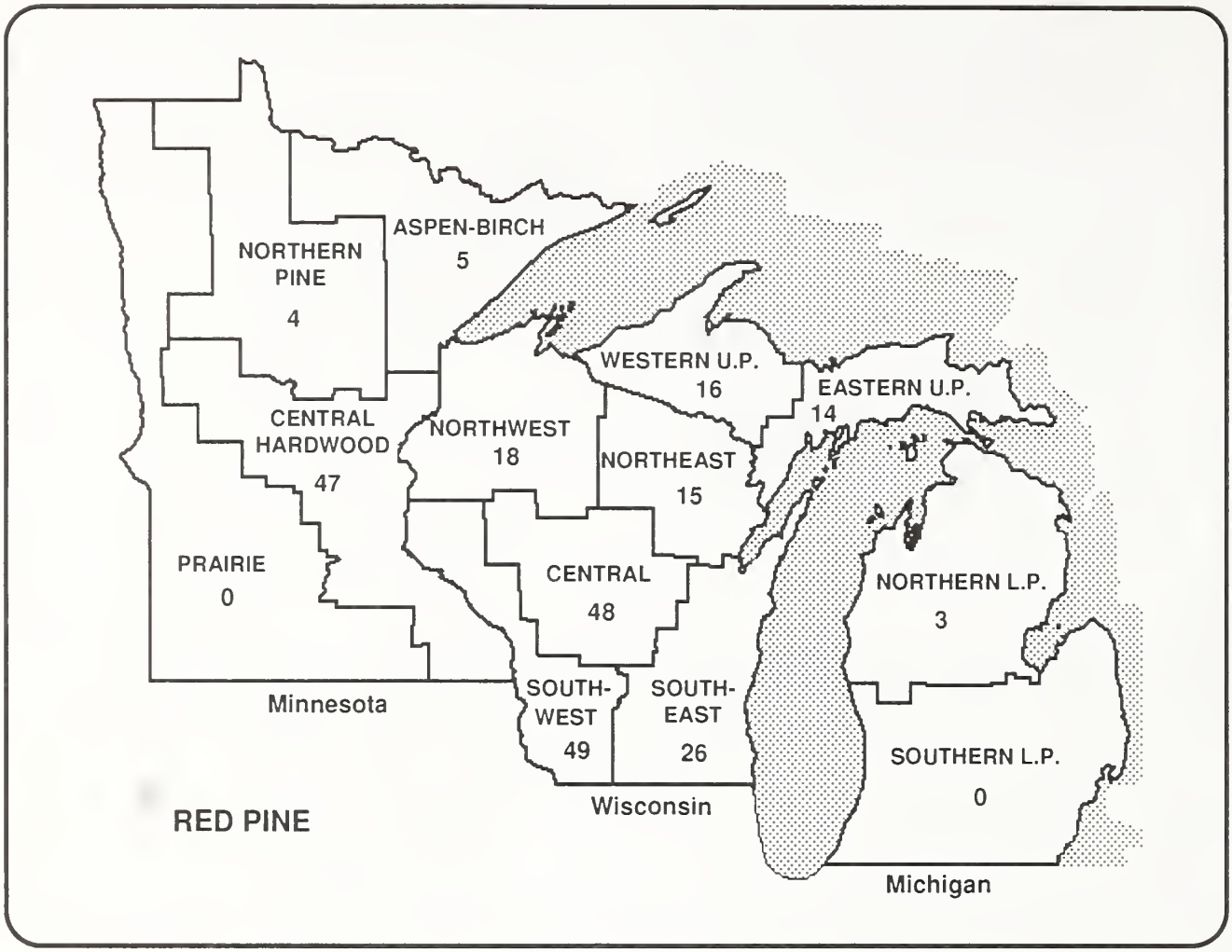
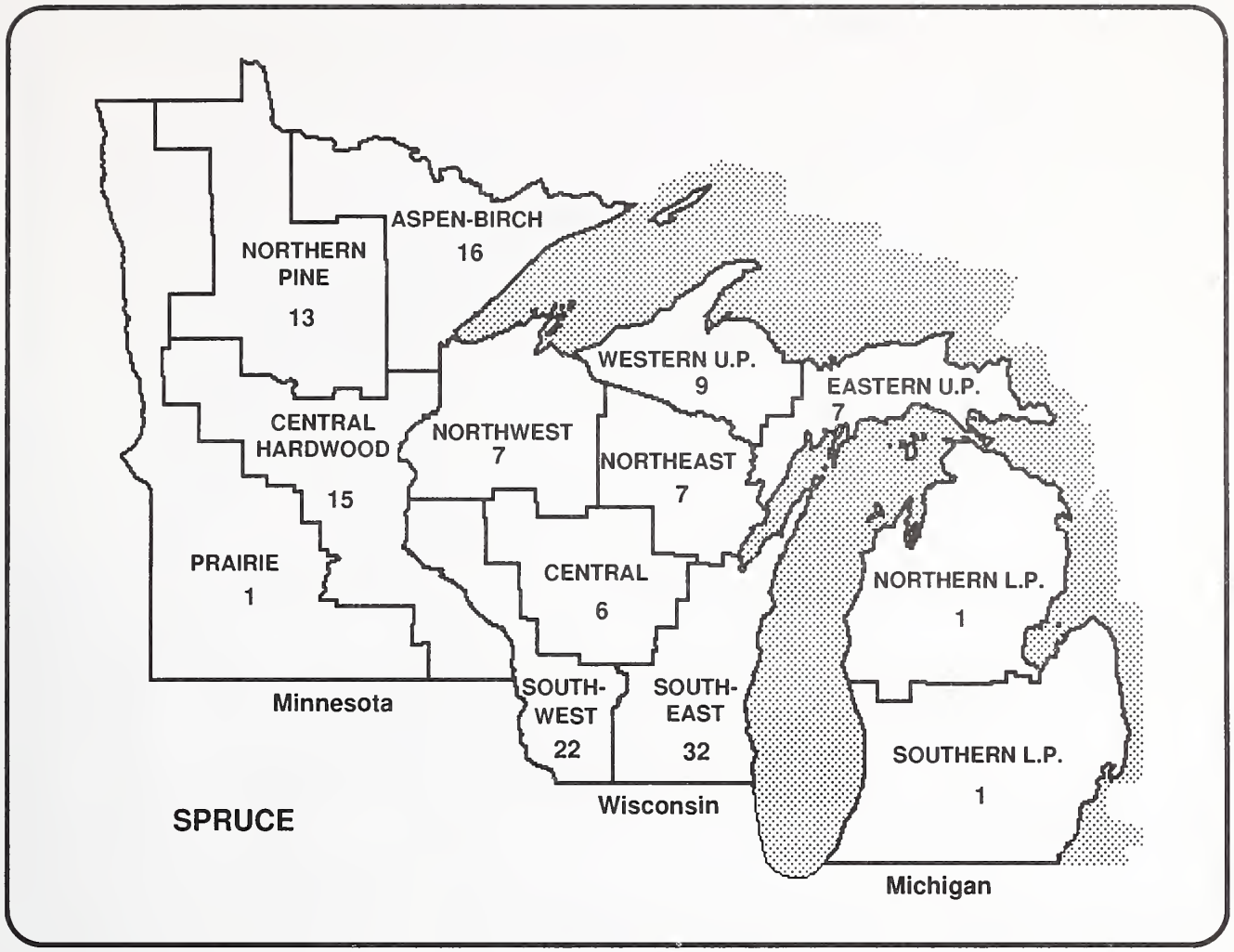
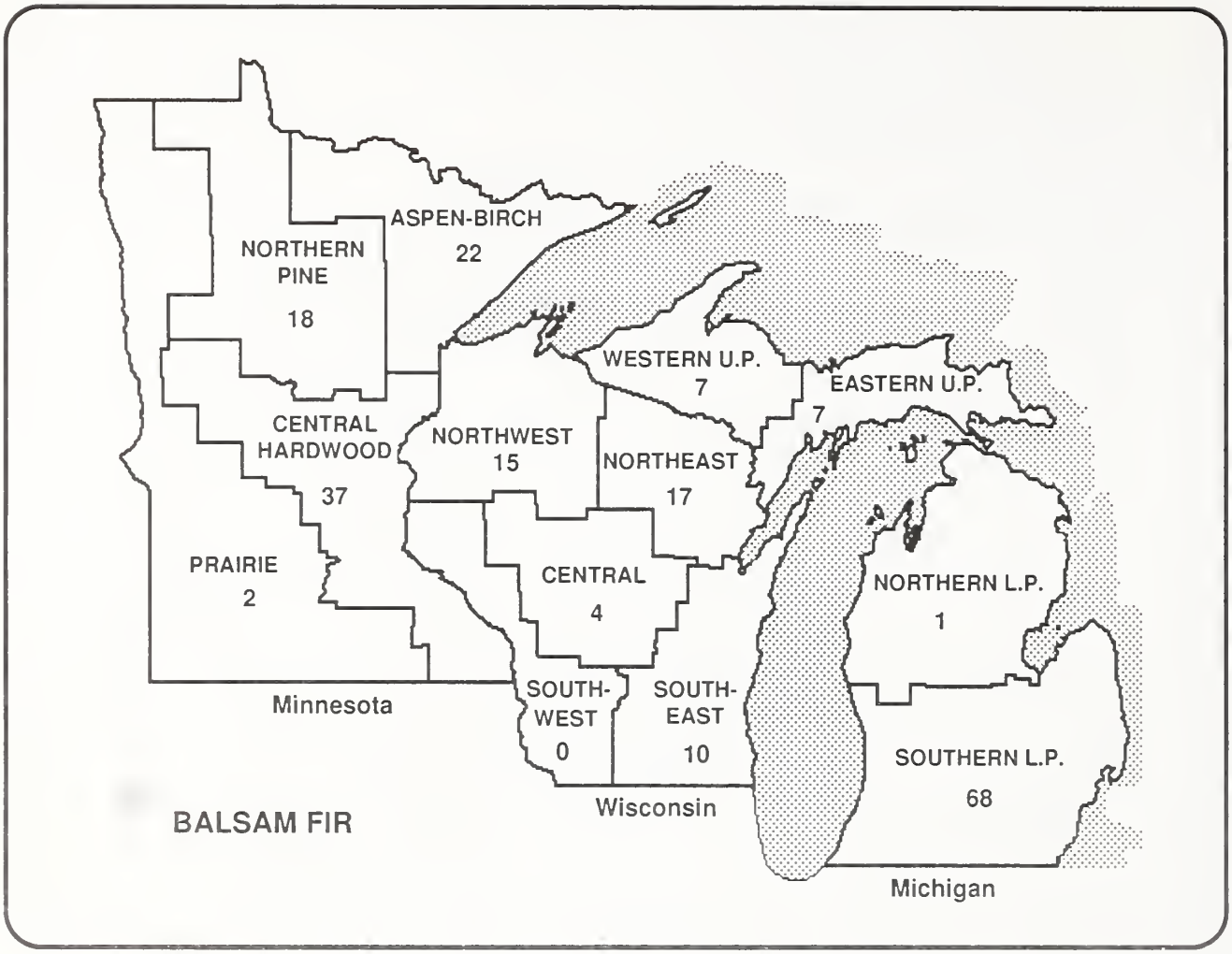
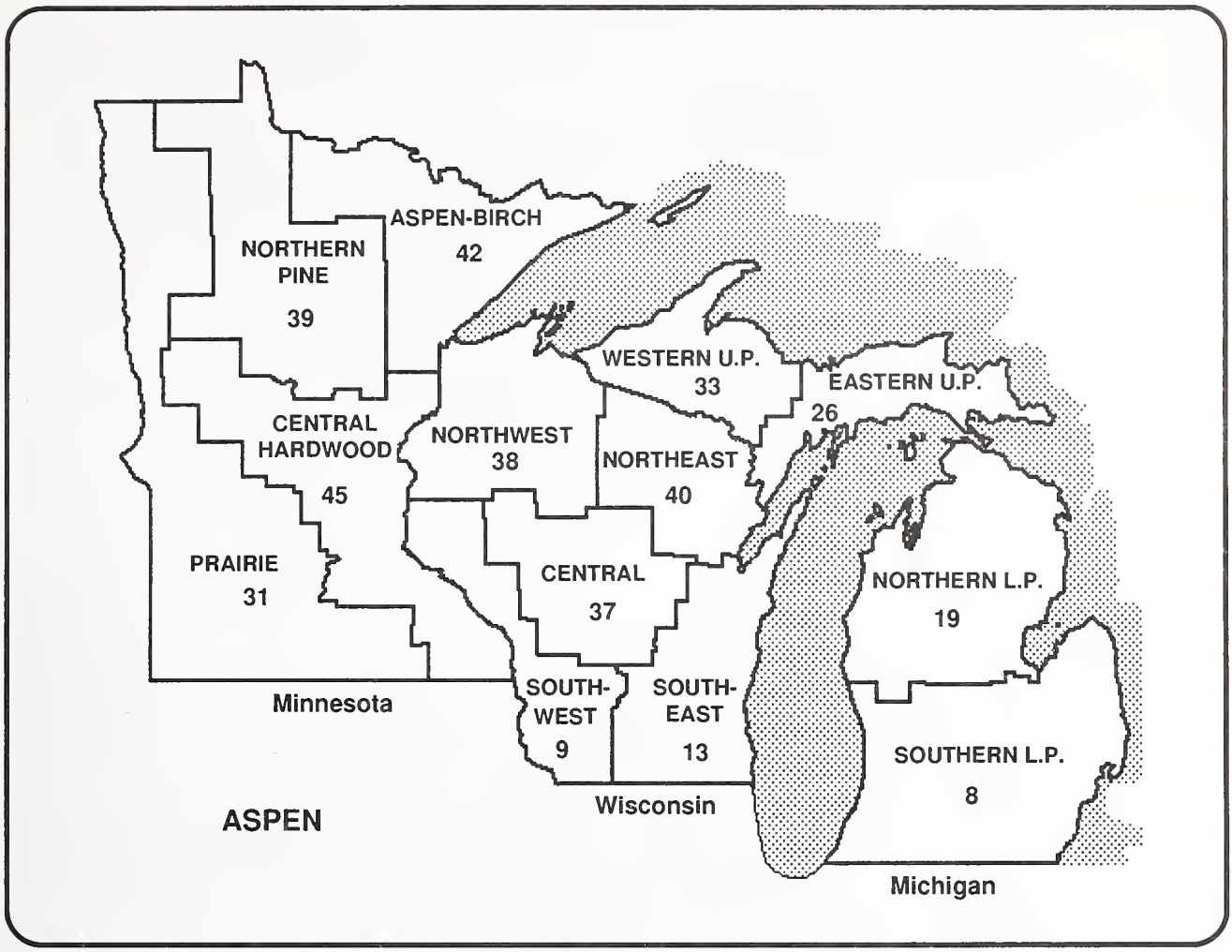


Figure 11.—*Cords of roundwood pulpwood (including chips from roundwood) harvested per 1,000 cords of growing-stock volume for each of five principal pulpwood species by Foirest Survey Unit, 1996. Growing-stock volume was determined during the last forest inventory in each State.*


NORTHERN PINE
4
ASPEN-BIRCH
5
CENTRAL HARDWOOD
47
NORTHWEST
18
WESTERN U.P.
16
EASTERN U.P.
14
NORTHEAST
15
PRAIRIE
0
CENTRAL
48
NORTHERN L.P.
3
SOUTH-WEST
49
SOUTH-EAST
26
SOUTHERN L.P.
0
Minnesota
Wisconsin
Michigan
RED PINE


ASPEN-BIRCH
16
NORTHERN
PINE
13
WESTERN U.P.
9
EASTERN U.P.
7
CENTRAL
HARDWOOD
15
NORTHWEST
7
NORTHEAST
7
PRAIRIE
1
CENTRAL
6
NORTHERN L.P.
1
Minnesota
SOUTH-
WEST
22
SOUTH-
EAST
32
SOUTHERN L.P.
1
Wisconsin
SPRUCE
Michigan


ASPEN-BIRCH
22
NORTHERN
PINE
18
WESTERN U.P.
7
EASTERN U.P.
7
CENTRAL
HARDWOOD
37
NORTHWEST
15
NORTHEAST
17
PRAIRIE
2
CENTRAL
4
NORTHERN L.P.
1
Minnesota
SOUTH-
WEST
0
SOUTH-
EAST
10
SOUTHERN L.P.
68
Wisconsin
Michigan
BALSAM FIR


ASPEN-BIRCH
42
NORTHERN
PINE
39
WESTERN U.P.
33
EASTERN U.P.
26
CENTRAL
HARDWOOD
45
NORTHWEST
38
NORTHEAST
40
PRAIRIE
31
CENTRAL
37
NORTHERN L.P.
19
SOUTH-
WEST
9
SOUTH-
EAST
13
SOUTHERN L.P.
8
Minnesota
Wisconsin
Michigan
ASPEN

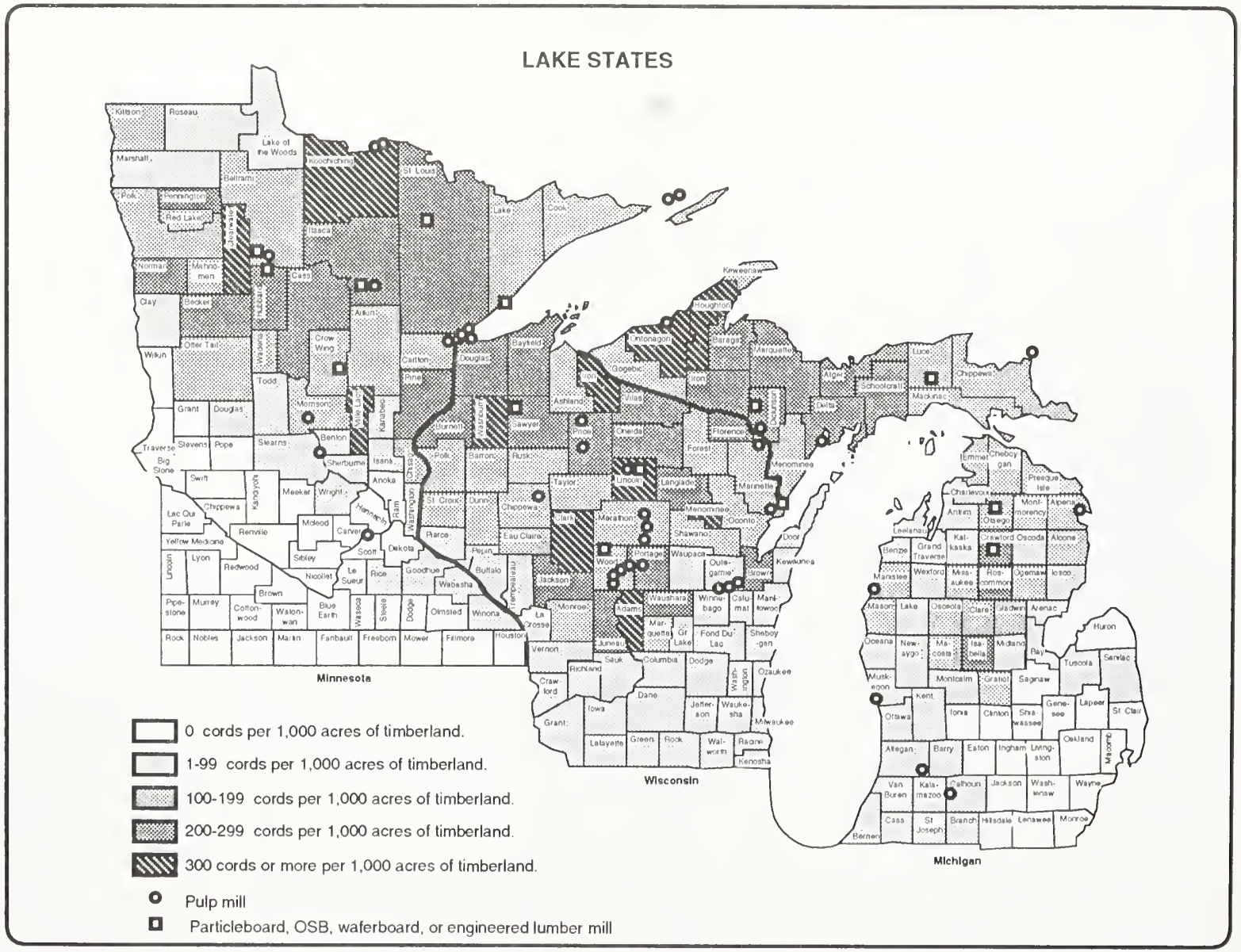

LAKE STATES
Minnesota
Wisconsin
Michigan
0 cords per 1,000 acres of timberland.
1-99 cords per 1,000 acres of timberland.
100-199 cords per 1,000 acres of timberland.
200-299 cords per 1,000 acres of timberland.
300 cords or more per 1,000 acres of timberland.
Pulp mill
Particleboard, OSB, waferboard, or engineered lumber mill

Figure 12.—*Cords of pulpwood cut per 1,000 acres of timberland in principal pulpwood-producing counties, 1996. Acres of timberland (stocking of trees greater than 16.7 percent) were determined during the last inventory in each State. Locations of active pulp and particleboard mills are shown.*

Pulpwood harvesting was most intensive in the following areas by species: (100,000 cords or more)

Species	State	Survey Unit
Jack pine	Michigan	N. Lower Peninsula
	Wisconsin	Northwest, Central
Red pine	Wisconsin	Central
Spruce	Minnesota	Aspen-Birch
Balsam fir	Minnesota	Aspen-Birch
Aspen	Michigan	N. Lower Peninsula, W. Upper Peninsula, E. Upper Peninsula
	Minnesota	Northern Pine, Aspen-Birch, Central Hardwood
	Wisconsin	Northwest, Northeast, Central
White birch	Wisconsin	Northwest, Northeast
Hard maple	Michigan	W. Upper Peninsula, E. Upper Peninsula
Soft maple	Michigan	N. Lower Peninsula, W. Upper Peninsula

RECEIPTS

- In 1996, 36 woodpulp and 14 particleboard mills in the Lake States acquired 9.8 million cords of pulpwood, down 1 percent from 1995 (fig. 13).
- In 1996, Michigan supplied wood to 33 mills, Wisconsin supplied 32 mills, and Minnesota supplied 28 mills.
- Total imports of roundwood increased by 6 percent, with Canada supplying 98 percent of the total import volume.
- Softwood residue imported from Canada decreased by 55 percent in 1996 to 13 thousand cords. Softwood residue imported from States outside the region increased by 14 percent to 92 thousand cords. The suppliers of the softwood residue from States outside the Lake States were Montana, South Dakota, and Wyoming.
- Total imports of all wood material decreased to 334 thousand cords, less than a 0.5 percent decrease from 1995. Canada contributed 67 percent of the total import receipts.

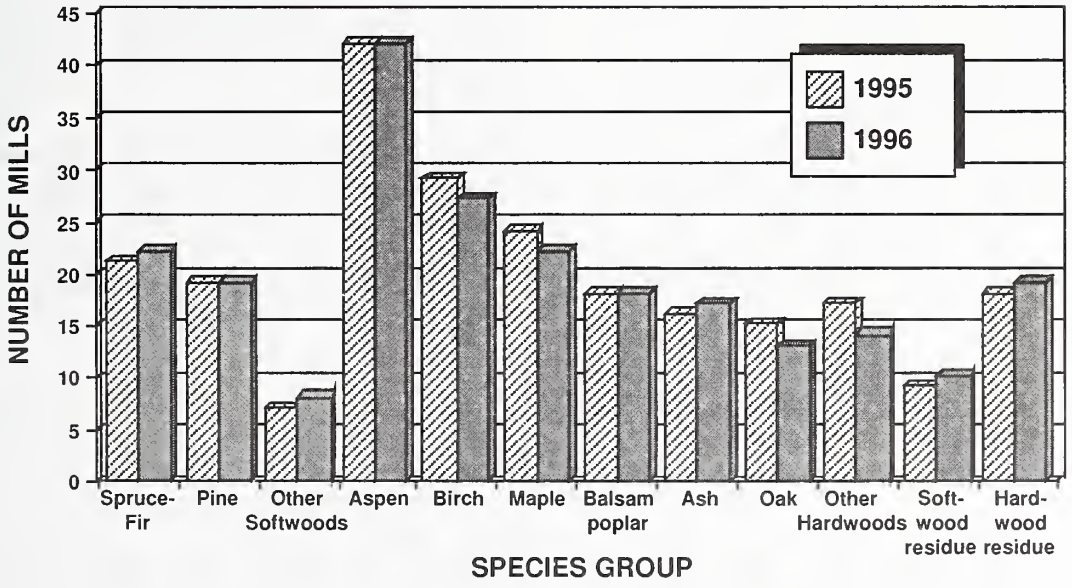


Figure 13.—*Numbers of industrial plants in the Lake States using a particular species or residue for pulping and particleboard, 1995-1996.*

Michigan

- Twelve Michigan mills consumed 3.1 million cords, up 2 percent from the previous year. Nine percent of the total consumption was imported from out of State, with Wisconsin supplying 75 percent of the imports.

Minnesota

- The 16 mills in Minnesota reported consuming an estimated 2.9 million cords in 1996, a decrease of 1 percent from 1995. Seven percent of Minnesota's consumption for pulpwood came from out-of-State sources. Canada furnished 64 percent of the imported wood material.

Wisconsin

- The 22 mills in Wisconsin consumed 3.8 million cords in 1996, a decrease of 1 percent from 1995. Of that total, 744 thousand cords were supplied by out-of-State sources, an increase of 19 percent from 1995.

INDUSTRY TRENDS AND ANALYSIS

Pulp Mills

In this section, pulp mills include wood fiber products such as paper, paperboard, hardboard, insulation board, and medium-density fiber board. All of these products are manufactured from wood that has been reduced to individual fibers, small fiber bundles, or fiber parts, which are subsequently formed into a mat.

- Of the 9.5 million cords of pulpwood produced in 1996, 6.8 million cords (71 percent) were used for wood-pulp products. Of each cord used to produce pulp, 91 percent was roundwood and 9 percent was residues.

- Principal species harvested for pulp were aspen (2,018 thousand cords), hard maple (623 thousand cords), jack pine (541 thousand cords), red pine (476 thousand cords), white birch (452 thousand cords), and soft maple (445 thousand cords) (fig. 14).

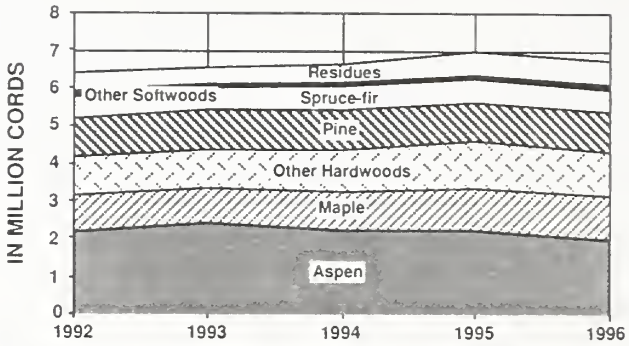


Figure 14.—*Pulpwood production in the Lake States for pulp by species group and residues, 1992-1996.*

- Hardwoods were still the mainstays of the pulp mills in the region in 1996 with hardwood roundwood contributing 62 percent of total production and hardwood residues supplying another 7 percent.

- The use of softwoods has increased steadily since 1988. In 1996, there was an 8 percent increase in softwood use from the previous year.

- Average daily woodpulp production was 14.3 thousand tons in 1996, up from 14.9 thousand tons in 1995 (table 3).

- Lake States pulpwood production for pulp mills in 1992-1996 was:

Species	Production				
	1992	1993	1994	1995	1996
	(Thousand cords)				
Roundwood					
Softwoods	1,702	1,780	1,790	1,776	1,920
Aspen	2,184	2,427	2,253	2,241	2,018
Other hardwoods	2,041	2,113	2,351	2,291	2,209
Residue	471	514	594	642	630
Total	6,398	6,834	6,989	6,949	6,778

Michigan

- Pulpwood production for wood fiber was 2.2 million cords in 1996. Aspen was the major pulpwood species harvested in the State with 413 thousand cords, a 17-percent decrease from 1995.

- Michigan mills imported 186 thousand cords of pulpwood for processing: 169 thousand cords from Wisconsin and 16 thousand cords from Indiana and Canada combined. Michigan exported 261 thousand cords to Minnesota and Wisconsin, and 20 thousand cords to Canada and States outside the region.

- Michigan mills used 1,727 thousand cords of hardwood material in 1996, a decrease of 3 percent from 1995. The use of softwood material in 1996 increased by 8 percent to 495 thousand cords.

Minnesota

- Pulpwood production for wood pulp products totaled 1.8 million cords in 1996. Aspen was the predominate species harvested in the State with 934 thousand cords, 3 percent less than the previous year.

- Mills in Minnesota imported 184 thousand cords for pulp products: 68 thousand cords from Wisconsin, 5 thousand cords from Michigan, and 111 thousand cords from Canada. Minnesota exported 264 thousand cords to Wisconsin and 38 thousand cords to Canada.

- In 1996, Minnesota mills had a 23-percent increase in the use of softwood roundwood from 1995, a 7-percent increase in the use of hardwood residues, no change in the use of softwood residues, and a 6-percent decrease in the use of hardwood roundwood.

Wisconsin

- Pulpwood production for wood pulp products totaled 2.8 million cords in 1996. Aspen was the main species harvested with 671 thousand cords, a 14-percent decrease from the previous year.

- Wisconsin mills imported 634 thousand cords of pulpwood: 256 thousand cords from Michigan, 264 thousand cords from Minnesota, 47 thousand cords from the Plains States, 48 thousand cords from other States (mostly Western States), and 19 thousand cords from Canada. Wisconsin exported 169 thousand cords to Michigan, 68 thousand cords to Minnesota, and 2 thousand cords to the Central States.

- The use of softwoods in Wisconsin mills increased by 3 percent and use of hardwoods decreased by 10 percent.

Particleboard Mills

Particleboard is a generic term for a panel manufactured from lignocellulosic material—commonly wood—essentially in the form of particles (as distinct from fibers). These materials are bonded together with synthetic resin or other suitable binder under heat and pressure by a process wherein the interparticle bonds are created wholly by the added binder and to which other materials may have been added during manufacture to improve certain properties. The many types of particleboard differ greatly in regard to size and geometry of the particle, the amount of resin (adhesive) used, and the density to which the panel is pressed. The major types of particles used for particleboard are shavings, flakes, wafers, chips, sawdust, strands, slivers, and wood wool (excelsior). Most particleboard in the U.S. is made from residues (shavings, sawdust, or chips), but some types require that roundwood (saw logs or pulpwood) be used. Wafer board is an example of a product requiring that the particles be cut from solid wood. A new product called engineered lumber was added to this generic term in 1992.

- The Lake States produced 2.7 million cords of pulpwood in 1996 for particleboard products, up 4 percent from 1995. For every cord of pulpwood used in particleboard manufacture, 93 percent came from roundwood and 7 percent was residues from wood-using plants (sawmills, veneer mills, etc.).

- Principal species harvested for particleboard products were aspen (2,102 thousand cords), jack pine (120 thousand cords), white birch (89 thousand cords), soft maple

(77 thousand cords), and balsam poplar (68 thousand cords) (fig. 15).

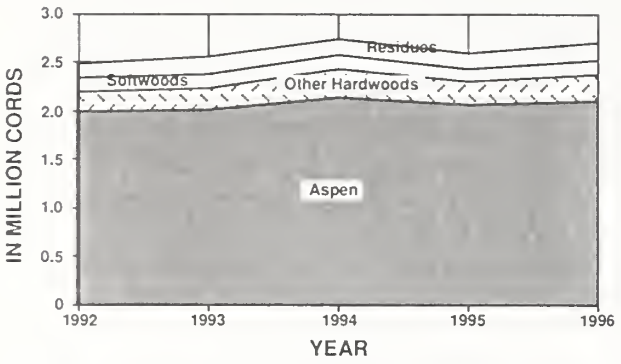


Figure 15.—*Pulpwood production for particleboard in the Lake States, 1992-1996.*

- Total softwood roundwood used for particleboard products increased from 128 thousand cords in 1995 to 146 thousand cords in 1996, an increase of 14 percent. Softwood residue use increased by 18 percent from 81 thousand cords in 1995 to 96 thousand cords in 1996.

- The use of hardwood roundwood increased from 2,324 thousand cords in 1995 to 2,383 thousand cords in 1996, an increase of 3 percent. Hardwood residue use increased by 1 percent—from 82 thousand cords in 1995 to 84 thousand cords in 1996.

- Lake States pulpwood production for particleboard mills in 1992-1996 was:

- National housing starts increased by 9 percent in 1996 to 1.5 million units. Stable and lower mortgage rates and a continuation of good economic reports helped contribute to the 4-percent increase in Lake States pulpwood production for particleboard products.

Michigan

- Pulpwood harvested for particleboard products totaled 782 thousand cords in 1996, of which aspen totaled 500 thousand cords. Residues used for particleboard products added another 107 thousand cords.

- The particleboard mills in Michigan imported 49 thousand cords from Wisconsin and 55 thousand cords from Canada. Raw materials exported for particleboard production amounted to 16 thousand cords.

Minnesota

- Timber logged for particleboard products totaled 1.3 million cords (47 percent of the Lake States total). The predominant species cut was aspen with 1.2 million cords, or 91 percent of Minnesota's total particleboard production.

- The particleboard mills in Minnesota imported 24 thousand cords from Canada and 2 thousand cords from the Plains States. In 1996, raw materials exported from the State for particleboard manufacturing totaled 88 thousand cords.

Species	Production				
	1992	1993	1994	1995	1996
	(Thousand cords)				
Roundwood					
Softwoods	157	152	149	128	146
Aspen	2,050	2,028	2,146	2,079	2,102
Other hardwoods	183	204	303	245	281
Residue	142	175	161	163	179
Total	2,532	2,559	2,759	2,616	2,708

Wisconsin

- Wisconsin produced 477 thousand cords of roundwood for particleboard manufacturing. The main species harvested was aspen with 438 thousand cords, or 81 percent of Wisconsin's total particleboard production.

- The mills in Wisconsin imported 110 thousand cords of wood for particleboard manufacturing: 88 thousand cords from Minnesota, 11 thousand cords from Michigan, and 11 thousand cords from Canada. Wisconsin exported 49 thousand cords to Michigan and Canadian particleboard mills in 1996.

New Mills, Expansions, and Closures

Major pulp mill expansion, new construction, and closures are as follows:

- Aspen Bay Pulp and Fibre is building the first bleached chemi-thermomechanical pulp mill in the U.S. in Menominee, MI. The 215,000 tpy mill should be finished by late 1997.

- Badger Paper Mills Inc., Peshtigo, WI, closed its pulp mill in June 1996.

- G-P Flakeboard Limited has completed construction of a medium density fiberboard (MDF) operation in Sault Ste. Marie, Ontario, Canada. The plant began operation in May of 1996.

- Potlatch Corp., Cloquet, MN, is rebuilding the bleached kraft pulp mill, doubling its capacity by the year 2000.

CENTRAL STATES

PRODUCTION

- Pulpwood production in the Central States (Illinois, Indiana, Iowa, and Missouri) decreased by 26 percent—from 528 thousand cords in 1995 to 393 thousand cords in 1996 (fig. 16). Illinois production rose 7 percent, Indiana fell 52 percent, Iowa fell 2 percent, and Missouri rose 28 percent above the 1995 production level.

- Pulpwood production from roundwood increased 27 percent in 1996. An increase in the number of Southern State mills pulling wood from Missouri accounts for most of this increase. Missouri's roundwood production increased 75 percent, with all of the increased production going to Southern States.

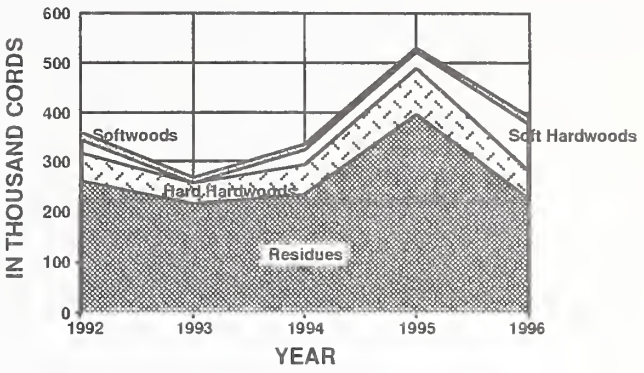


Figure 16.—*Pulpwood production in the Central States, 1992-1996.*

- Roundwood made up 43 percent of the total wood material used for pulpwood production in the Central States in 1996.

- Pulpwood production from soft hardwood[7] roundwood rose from 32 thousand cords in 1995 to 90 thousand cords in 1996. Hard hardwood[8] production decreased from 89 thousand cords in 1995 to 61 thousand cords in 1996.

- Residue use for the production of pulpwood decreased by 43 percent in 1996. The closing of two particleboard plants in Indiana accounts for most of this decrease. Residue production for Indiana fell by 67 percent.

- Hardwood residue from primary wood-using mills made up all but 2 thousand cords of the 226 thousand cords of total residue produced.

- Exports of roundwood and residues from the Central States in 1996 increased by 6 percent to 263 thousand cords. Central States pulpwood was shipped to Arkansas, Kentucky, Michigan, Ohio, and Wisconsin mills.

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[7]*Hardwood species with an average specific gravity of 0.50 or less.*

[8]*Hardwood species with an average specific gravity greater than 0.50.*

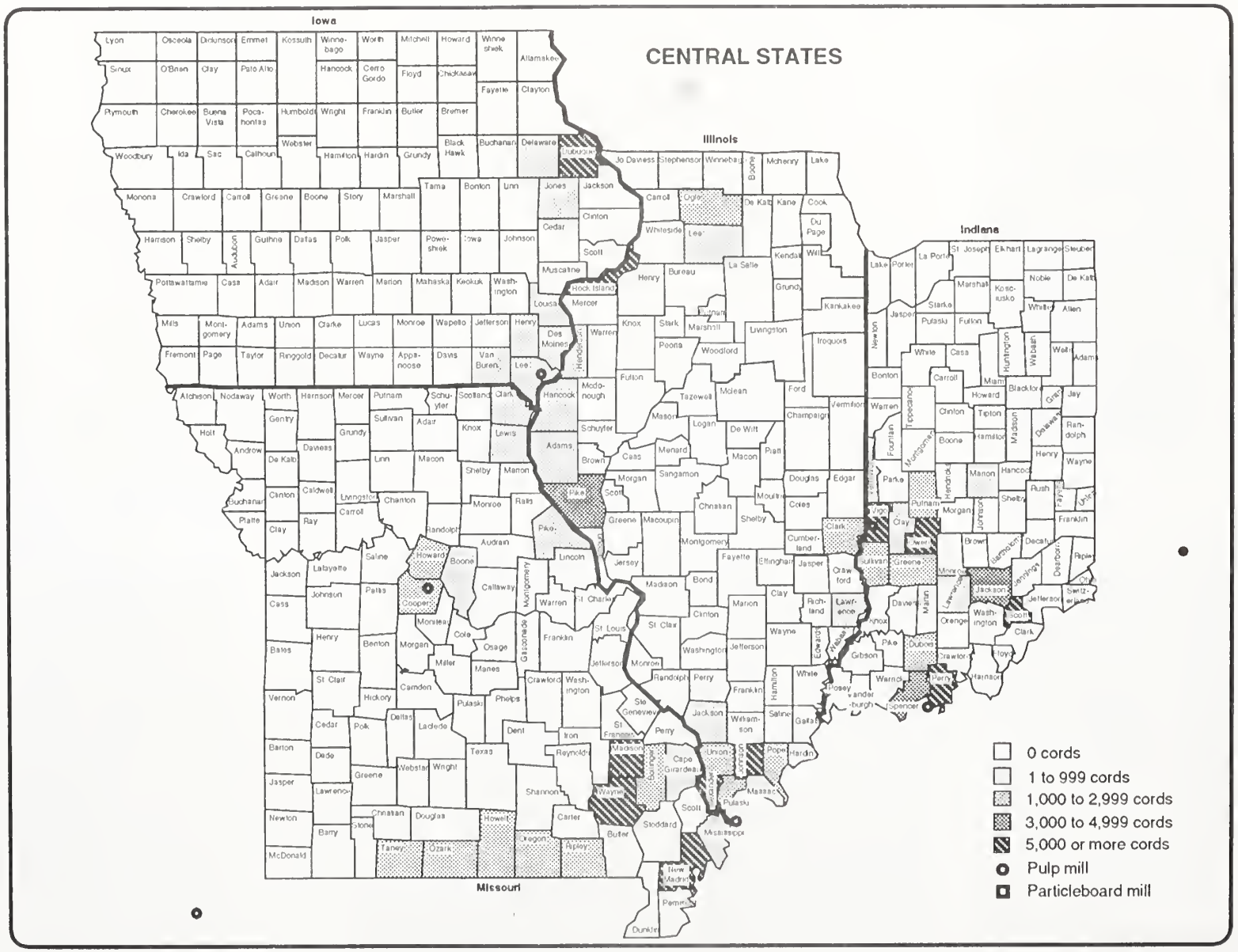

Figure 17.—*Production of pulpwood from roundwood (including chips from roundwood) in the Central States by counties, in standard cords, 1996. Locations of Central States and nearby pulp and particleboard mills using Central States pulpwood are shown.*

- Loggers harvested pulpwood in 17 counties of Illinois; 14 counties in Indiana; 8 counties in Iowa; and 17 counties in Missouri (fig. 17).

- Whole-tree chips made up 13 percent of the pulpwood production for the Central States in 1996. The 50 thousand cords of whole tree chips were a 10-percent increase from the 1995 volume.

Illinois

- Illinois produced 95 thousand cords of pulpwood in 1996, up 17 percent from 1995. Illinois contributed 24 percent of the total production in the Central States in 1996 (fig. 18).

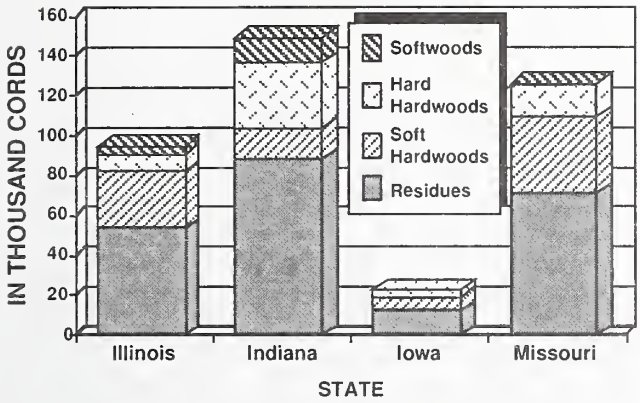

Figure 18.—*Central States pulpwood production by species group and residues, 1996.*

- Illinois does not have any primary woodpulp or particleboard mills; consequently, all pulpwood harvested is shipped to plants outside the State.

Indiana

- Pulpwood production in Indiana accounted for 38 percent of the total pulpwood produced in the Central States region in 1996, or 149 thousand cords, a 52-percent increase from 1995.

- Roundwood production increased 37 percent in 1996, while residue production decreased 67 percent.

Iowa

- The total pulpwood production in 1996 was 23 thousand cords, 6 percent of the region's total.

- Hardwood residues account for 55 percent of Iowa's pulpwood production in 1996, soft hardwood roundwood accounted for 31 percent, and hard hardwood roundwood accounted for 14 percent.

Missouri

- Missouri was the second largest producer of pulpwood in the Central States in 1996, at 126 thousand cords or 32 percent of the region's total. Missouri pulpwood production increased by 12 percent from 1995.

- Missouri exported 115 thousand cords or 92 percent of the State's pulpwood production to mills in the Southern Region.

RECEIPTS

- Pulp and particleboard mills in three Central States received 132 thousand cords in 1996, down 55 percent from 1995.

- Hardwood residue receipts decreased by 66 percent from 204 thousand cords in 1995 to 70 thousand cords in 1996.

- Softwoods were not used for pulpwood in the Central States.

INDUSTRY TRENDS AND ANALYSIS

- Average daily wood-pulp production remained steady in 1996 at 834 tons (table 6).

- In 1996, only 35 percent of the roundwood and 21 percent of the residues produced in the Central States went to pulp or particleboard mills located in the Central States.

- Hardwood residue from sawmills continues to be the dominant form of pulpwood procured for Central States pulp and particleboard mills.

PLAINS STATES

PRODUCTION AND RECEIPTS

- Pulpwood production in the Plains States was 110 thousand cords in 1996, a decrease of 4 percent from 1995. Production came from Kansas, North Dakota, and South Dakota (fig. 19).

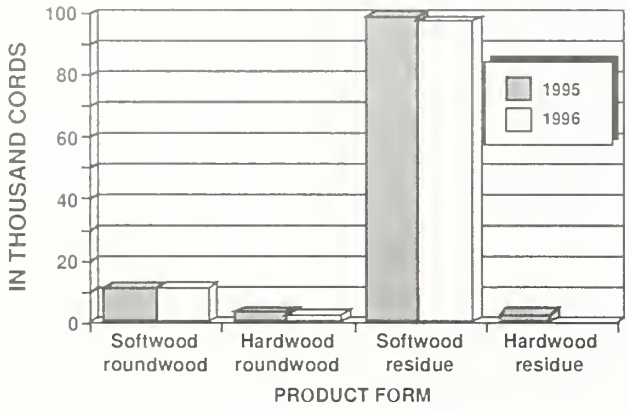

Figure 19.—*Pulpwood production in the Plains States, 1995-1996.*

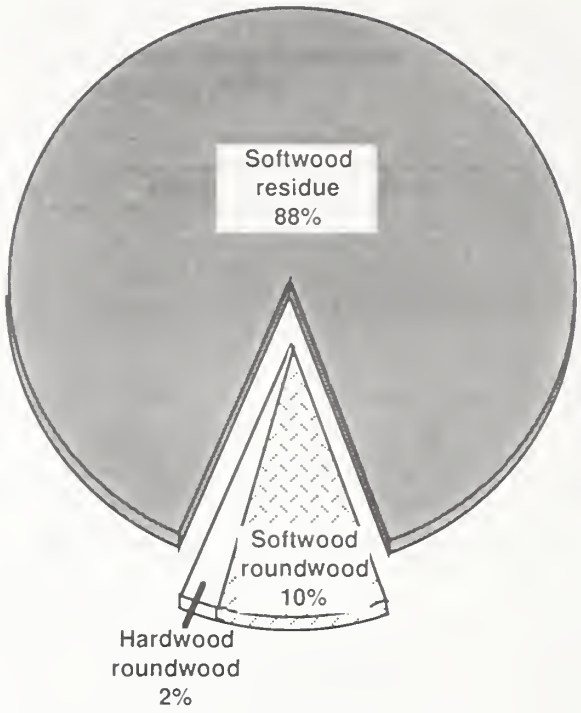

Figure 20.—*Plains States pulpwood production, 1996.*

- Softwood residues accounted for 88 percent of the pulpwood production for the Plains States in 1996, all of which came from Kansas and South Dakota (fig. 20).

- Forty-seven thousand cords of softwood residue from the Plains States were exported to Wisconsin in 1996. Another 1 thousand cords were sent to Oklahoma.

- Two thousand cords of aspen and balsam poplar roundwood from the Plains States were exported to Minnesota in 1996.

- The Plains States imported 58 thousand cords of softwood residue from Wyoming in 1996.

- All of the pulpwood received in the Plains States was processed at Merillat Industries, Inc. (particleboard), in Rapid City, SD, which has a production capacity of 95 million square feet 3/4 basis.

APPENDIX

Conversion Factors Used in the North-Central Region

Standard cords of green roundwood per green ton:

Species	Factor	Species	Factor
Softwoods	0.4688	White birch	0.4018
N. white-cedar	.6329	Yellow birch	.3723
Balsam fir	.4688	River birch	.3871
Hemlock	.4150	Sweetgum	.3669
Jack pine	.4688	Yellow-poplar	.4219
Red pine	.4688	Blackgum	.3779
White pine	.4777	Sycamore	.4083
Shortleaf pine	.3956	Cottonwood	.4291
Spruce	.5014	Elm	.4018
Tamarack	.4291	Hickory	.3701
Hardwoods	.3939	Hard maple	.3617
Soft hardwoods	.4171	Soft maple	.4083
Hard hardwoods	.3708	Black cherry	.4688
Ash	.4330	Red oak	.3444
Aspen	.4291	White oak	.3723
Balsam poplar	.4083	Black oak	.3444
Basswood	.5167	Other hardwoods	.4777
Beech	.3956		

Table 2.—Numbers of industrial plants in the Lake States using a particular species or residue for pulping or particleboard in 1996

Product form and species group	Total Lake States	State		
		Michigan	Minnesota	Wisconsin
Roundwood				
Softwoods				
Northern white-cedar	2	2	--	--
Balsam fir	20	4	6	10
Hemlock	6	1	--	5
Jack pine	14	4	4	6
Red pine	18	3	8	7
White pine	10	2	2	6
Spruce	19	4	7	8
Tamarack	5	1	1	3
Total plants using softwood roundwood[1]	25	5	10	10
Hardwoods				
Ash	17	8	1	8
Aspen	42	10	15	17
Balsam poplar	18	7	8	3
Basswood	13	9	--	4
Beech	7	6	--	1
White birch	26	9	7	10
Yellow birch	12	7	--	5
Cottonwood	3	1	--	2
Elm	6	3	--	3
Hickory	1	--	--	1
Hard maple	21	9	2	10
Soft maple	21	10	1	10
Red oak	13	7	--	6
White oak	6	3	--	3
Other hardwoods	7	5	--	2
Total plants using hardwood roundwood[1]	47	11	15	21
Total plants using roundwood[1]	49	12	16	21
Residues				
Softwood	10	2	2	6
Hardwood	19	7	4	8
Total plants using residues[1]	20	7	4	9
Total plants[1]	50	12	16	22

[1] Some plants use more than one species, so numbers in columns are not additive.

Table 3.—Average daily production of active woodpulp mills in the Lake States by mill, location, and type of pulp produced, 1996

(In tons per 24 hours)

Company	Location	All types	Type of pulp					
			Sulfite	Kraft	Groundwood/ mechanical	Semi-chemical	Thermo-chemical	Thermo-mechanical
Michigan								
ABT Co.	Alpena	400	--	--	400	--	--	--
American Fibrit Inc.	Battle Creek	4	--	--	--	--	4	--
Champion International Corp.	Quinnesec	1,150	--	1,150	--	--	--	--
Mead Corp.	Escanaba	1,500	--	1,500	--	--	--	--
Menasha Corp.	Otsego	350	--	--	--	350	--	--
S. D. Warren Co.	Muskegon	304	--	304	--	--	--	--
Stone Container Corp.	Ontonagon	520	--	--	--	520	--	--
TENNECO Packaging	Manistee	900	--	--	--	900	--	--
Total	8 mills	5,128	--	2,954	400	1,770	4	--
Minnesota								
Blandin Paper Co.	Grand Rapids	482	--	--	482	--	--	--
Boise Cascade Corp.	International Falls	960	--	960	--	--	--	--
Certain-Teed Corp.	Shakepee	240	--	--	--	--	--	240
Champion International Corp.	Sartell	370	--	--	--	--	--	370
Consolidated Papers Inc.	Duluth	440	--	--	440	--	--	--
Georgia-Pacific Corp.	Bemidji	100	--	--	100	--	--	--
Georgia-Pacific Corp.	Duluth	290	--	--	--	--	--	290
Hennepin Paper Co.	Little Falls	100	--	--	100	--	--	--
International Bildrite, Inc.	International Falls	110	--	--	110	--	--	--
Potlatch Corp.	Cloquet	520	--	520	--	--	--	--
Total	10 mills	3,612	--	1,480	1,232	--	--	900
Wisconsin								
Appleton Papers Inc.	Combined Locks	89	--	--	--	89	--	--
Badger Paper Mills Inc.	Peshtigo	110	110	--	--	--	--	--
Consolidated Papers Inc.	Biron	216	--	--	216	--	--	--
Consolidated Papers Inc.	Niagara	280	--	--	280	--	--	--
Consolidated Papers Inc.	Stevens Point	123	--	--	123	--	--	--
Consolidated Papers Inc.	Wisconsin Rapids	1,116	--	1,116	--	--	--	--
Fraser Papers Inc.	Park Falls	170	170	--	--	--	--	--
Georgia-Pacific Corp.	Nekoosa	390	--	390	--	--	--	--
Georgia-Pacific Corp.	Phillips	75	--	--	75	--	--	--
Georgia-Pacific Corp.	Port Edwards	230	230	--	--	--	--	--
Georgia-Pacific Corp.	Superior	140	--	--	140	--	--	--
Globe Building Materials Inc.	Cornell	105	--	--	--	--	--	105
Mosinee Paper Corp.	Mosinee	285	--	285	--	--	--	--
Repap Wisconsin Inc.	Kimberly	100	--	--	100	--	--	--
TENNECO Packaging	Tomahawk	1,378	--	--	--	1,378	--	--
Thilmany Paper	Kaukauna	387	--	387	--	--	--	--
Wausau Paper Mills Corp.	Brokaw	265	265	--	--	--	--	--
Weyerhaeuser Paper Co.	Rothschild	146	146	--	--	--	--	--
Total	18 mills	5,605	921	2,178	934	1,467	--	105
Lake States total	36 mills	14,345	921	6,612	2,566	3,237	4	1,005

Table 4.—Annual production of active particleboard and panel mills in the Lake States by mill, location, and product produced, 1996

(Million square feet 3/4-inch basis)

Company	Location	Product produced	Annual Production capacity
Michigan			
Georgia-Pacific	Gaylord	Particleboard	236
Louisiana-Pacific	Newberry	Oriented strand board	61
Louisiana-Pacific	Sagola	Oriented strand board	155
Weyerhaeuser Co.	Grayling	Oriented strand board	200
Total		4 mills	652
Minnesota			
Louisiana-Pacific	Two Harbors	Oriented strand board	61
Northwood Panelboard Co.	Solway	Oriented strand board	170
Potlatch Corp.	Bemidji	Oriented strand board	480
Potlatch Corp.	Cook	Oriented strand board	241
Potlatch Corp.	Grand Rapids	Oriented strand board	340
Total		5 mills	1,292
Wisconsin			
Louisiana-Pacific	Hayward	Waferboard	235
Louisiana-Pacific	Tomahawk	Oriented strand board	73
Rodman Industries	Marinette	Particleboard	15
Weyerhaeuser Co.	Marshfield	Particleboard	71
Total		4 mills	394
Lake States total		13 mills	2,338

Table 5.—Production and imports of pulpwood, Central States and Plain States, 1996[1]

(In standard cords, unpeeled)

Product form, species group, and destination	Production by State[2]						Imports			
	Illinois	Indiana	Iowa	Missouri	Plains States[3]	Regional total	Lake States	Other U.S.	Total imports	Total receipts
Roundwood										
Softwoods										
Lake States	1,839	--	--	--	--	1,839	--	--	--	--
Northeastern States	--	12,684	--	--	--	12,684	--	--	--	--
Plain States	--	--	--	--	10,800	10,800	--	--	--	10,800
Southern States	2,314	--	--	157	--	2,471	--	--	--	--
Total	4,152	12,684	--	157	10,800	27,793	--	--	--	10,800
Soft hardwoods[4]										
Central States	8,811	6,605	7,164	5,736	--	28,316	--	--	--	28,316
Lake States	--	--	--	--	2,331	2,331	--	--	--	--
Southern States	19,968	8,775	--	32,579	--	61,322	--	--	--	--
Total	28,779	15,380	7,164	38,315	2,331	91,969	--	--	--	28,316
Hard hardwoods[5]										
Central States	6,031	24,482	3,134	505	--	34,152	--	--	--	34,152
Northeastern States	--	52	--	--	--	52	--	--	--	--
Southern States	2,510	8,071	--	16,032	--	26,613	--	--	--	--
Total	8,541	32,605	3,134	16,537	--	60,816	--	--	--	34,152
Total roundwood										
Central States	14,842	31,087	10,298	6,240	--	62,468	--	--	--	62,468
Lake States	1,839	--	--	--	2,331	4,169	--	--	--	--
Northeastern States	--	12,735	--	--	--	12,735	--	--	--	--
Plain States	--	--	--	--	10,800	10,800	--	--	--	10,800
Southern States	24,791	16,846	--	48,768	--	90,406	--	--	--	--
Total	41,472	60,668	10,298	55,008	13,131	180,578	--	--	--	73,268
Residues										
Softwoods										
Lake States	--	--	--	--	47,118	47,118	--	--	--	--
Plain States	--	--	--	--	48,839	48,839	--	58,000	58,000	106,839
Southern States	22	197	--	1,940	805	2,965	--	--	--	--
Total	22	197	--	1,940	96,763	98,923	--	58,000	58,000	106,839
Hardwoods										
Central States	38,630	12,988	11,435	4,286	--	67,340	2,318	--	2,318	69,658
Lake States	--	12,638	1,158	--	--	13,796	--	--	--	--
Southern States	14,823	62,691	--	64,739	--	142,254	--	--	--	--
Total	53,453	88,318	12,593	69,026	--	223,390	2,318	--	2,318	69,658
Total Residues										
Central States	38,630	12,988	11,435	4,286	--	67,340	2,318	--	2,318	69,658
Lake States	--	12,638	1,158	--	47,118	60,914	--	--	--	--
Plain States	--	--	--	--	48,839	48,839	--	58,000	58,000	106,839
Southern States	14,846	62,889	--	66,680	805	145,219	--	--	--	--
Total	53,476	88,515	12,593	70,966	96,763	322,313	2,318	58,000	60,318	176,497
All wood material										
Central States	53,472	44,075	21,734	10,527	--	129,808	2,318	--	2,318	132,126
Lake States	1,839	12,638	1,158	--	49,449	65,084	--	--	--	--
Northeastern States	--	12,735	--	--	--	12,735	--	--	--	--
Plain States	--	--	--	--	59,639	59,639	--	58,000	58,000	117,639
Southern States	39,637	79,735	--	115,448	805	235,625	--	--	--	--
Total	94,948	149,184	22,892	125,975	109,894	502,891	2,318	58,000	60,318	249,765

[1] Table may not add due to rounding.

[2] Vertical columns of figures under the box heading "Production by State" present the amount of roundwood cut or residue generated in each State.

[3] Includes Kansas, Nebraska, South Dakota, and North Dakota.

[4] Hardwood species with an average specific gravity of 0.50 or less.

[5] Hardwood species with an average specific gravity greater than 0.50.

Table 6.—Average production of active woodpulp mills in the Central States by mill, location, and type of pulp produced, 1996

(In tons per 24 hours)

Company	Location	All types	Type of pulp	
			Groundwood/ Mechanical	Semi-chemical
The Weston Paper and Mfg. Co.	Terre Haute, Indiana	554	--	554
Four M Paper Corp.	Fort Madison, Iowa	202	--	202
Huebert Fiberboard Co.	Boonville, Missouri	78	78	--
Central States total	3 mills	834	78	756

Table 7.—Lake States pulpwood production by State of origin and destination, 1992-1996

(In thousand cords, unpeeled)[1]

MICHIGAN

Year	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other[2]
1992	2,877	2,533	3	323	18
1993	3,154	2,859	11	272	13
1994	3,254	2,915	17	310	11
1995	3,112	2,733	18	346	16
1996	3,111	2,815	5	267	25
5-year average	3,102	2,771	11	304	17

MINNESOTA

Year	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other[2]
1992	2,672	--	2,520	105	47
1993	2,969	--	2,783	146	39
1994	3,029	11	2,812	164	41
1995	2,971	4	2,738	178	50
1996	3,065	--	2,676	352	38
5-year average	2,941	3	2,706	189	43

WISCONSIN

Year	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other[2]
1992	3,296	253	56	2,987	--
1993	3,270	244	55	2,970	1
1994	3,465	241	55	3,167	2
1995	3,482	231	80	3,168	2
1996	3,309	218	68	3,020	3
5-year average	3,364	237	63	3,062	2

[1] Includes mill residues used for pulp.

[2] Includes Canada.

Table 8.—Lake States pulpwood production by Forest Survey Unit and destination by State, 1996

(In thousand standard cords, unpeeled)

MICHIGAN

Product form and Forest Survey Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other[1]
Roundwood					
Eastern Upper Peninsula	689	647	--	33	9
Western Upper Peninsula	1,217	1,006	5	198	8
Northern Lower Peninsula	861	842	--	18	1
Southern Lower Peninsula	67	67	--	--	--
Total	2,834	2,562	5	249	18
Residues	277	253	--	18	6
Total pulpwood	3,111	2,815	5	267	25

MINNESOTA

Product form and Forest Survey Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other[1]
Roundwood					
Aspen-Birch	1,321	--	1,105	216	--
Northern Pine	1,232	--	1,192	39	--
Central Hardwood	296	--	208	88	--
Prairie	48	--	48	*	--
Total	2,897	--	2,553	344	--
Residues	168	--	123	8	38
Total pulpwood	3,065	--	2,676	352	38

WISCONSIN

Product form and Forest Survey Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other[1]
Roundwood					
Northeastern	1,003	172	1	831	--
Northwestern	1,210	13	59	1,138	--
Central	618	--	1	617	--
Southwestern	75	--	1	74	--
Southeastern	40	10	--	29	--
Total	2,945	195	62	2,689	--
Residues	364	23	6	332	3
Total pulpwood	3,309	218	68	3,020	3

* Less than 500 standard cords, unpeeled.

[1] Includes Canada

Table 9.—Lake States annual pulpwood production from roundwood by species group, State, and Forest Survey Unit, 1992-1996

(In thousand standard cords, unpeeled)

Forest Survey Unit	All species					Pine					Spruce				
	1992	1993	1994	1995	1996	1992	1993	1994	1995	1996	1992	1993	1994	1995	1996
MICHIGAN															
Eastern Upper Peninsula	720	778	773	774	689	128	149	111	147	126	26	27	23	27	27
Western Upper Peninsula	1,101	1,051	1,140	1,149	1,217	125	115	101	99	106	43	39	38	39	50
Northern Lower Peninsula	788	1	1,035	845	861	110	116	132	108	141	1	2	1	1	1
Southern Lower Peninsula	39	64	65	66	67	*	*	*	*	*	-	-	--	--	*
Total	2,649	2,909	3,013	2,834	2,834	363	380	344	355	373	70	67	62	66	78
MINNESOTA															
Aspen-Birch	1,129	1,330	1,318	1,263	1,321	49	56	46	40	38	115	125	137	118	158
Northern Pine	1,299	1,341	1,283	1,263	1,232	68	81	60	65	51	30	33	29	31	44
Central Hardwood	136	163	222	242	296	20	20	14	17	29	1	1	1	1	3
Prairie	20	23	35	43	48	*	*	--	--	--	-	-	--	--	*
Total	2,585	2,857	2,858	2,810	2,897	136	156	120	122	119	146	158	165	150	204
WISCONSIN															
Northeast	1,117	1,054	1,066	1,020	1,003	142	141	135	132	158	18	13	12	16	16
Northwest	1,201	1,221	1,312	1,334	1,210	204	225	242	228	231	20	19	16	19	18
Central	574	575	640	661	618	276	277	307	285	264	2	1	1	3	1
Southwest	81	58	65	65	75	47	34	38	33	39	1	1	1	2	1
Southeast	35	30	38	35	40	26	15	15	17	20	1	*	1	1	1
Total	3,008	2,937	3,121	3,115	2,945	695	692	738	695	712	51	34	31	40	34
Total Lake States	8,242	8,703	8,992	8,759	8,676	1,195	1,228	1,201	1,172	1,203	257	259	258	256	318

(Table 9 continued on next page.)

(Table 9 continued.)

Forest Survey Unit	Balsam fir					Other softwoods					Aspen				
	1992	1993	1994	1995	1996	1992	1993	1994	1995	1996	1992	1993	1994	1995	1996
MICHIGAN															
Eastern Upper Peninsula	44	55	55	34	25	26	25	43	30	32	200	211	181	192	152
Western Upper Peninsula	36	44	45	43	38	24	24	41	46	53	367	373	360	368	334
Northern Lower Peninsula	3	3	2	2	2	*	*	*	*	*	460	545	527	429	406
Southern Lower Peninsula	-	-	--	--	*	--	--	*	--	*	7	13	16	13	22
Total	83	101	103	79	65	50	49	84	76	85	1,033	1,142	1,084	1,003	913
MINNESOTA															
Aspen-Birch	104	114	114	119	171	1	2	2	11	11	782	925	862	831	816
Northern Pine	81	84	70	76	75	1	1	1	2	2	1,073	1,105	1,061	1,021	988
Central Hardwood	2	2	1	2	6	--	--	--	*	--	110	131	197	209	247
Prairie	-	11	--	--	*	--	--	--	*	--	20	23	35	43	47
Total	187	199	185	198	252	1	3	3	12	13	1,985	2,185	2,155	2,103	2,098
WISCONSIN															
Northeast	29	30	31	30	41	24	20	32	27	26	452	405	393	397	367
Northwest	32	31	31	41	50	8	9	9	7	7	554	544	573	614	539
Central	*	1	*	1	1	2	2	2	2	2	175	152	163	179	170
Southwest	*	*	*	*	*	*	*	--	*	*	29	18	17	17	24
Southeast	*	*	*	1	*	*	*	*	*	*	6	10	13	8	11
Total	61	61	63	73	92	34	31	42	37	36	1,216	1,129	1,159	1,214	1,109
Total Lake States	331	361	351	350	410	85	83	129	125	135	4,234	4,455	4,399	4,320	4,121

(Table 9 continued on next page.)

(Table 9 continued.)

Forest Survey Unit	Birch					Maple					Other hardwoods				
	1992	1993	1994	1995	1996	1992	1993	1994	1995	1996	1992	1993	1994	1995	1996
MICHIGAN															
Eastern Upper Peninsula	61	64	75	51	77	156	193	215	237	203	79	55	71	57	48
Western Upper Peninsula	86	81	87	84	144	312	280	351	375	370	108	95	117	94	122
Northern Lower Peninsula	35	51	50	42	35	111	143	163	156	188	69	156	160	106	88
Southern Lower Peninsula	*	2	1	*	*	8	14	8	11	16	25	36	40	42	28
Total	183	197	213	177	256	586	630	736	779	777	281	342	387	299	287
MINNESOTA															
Aspen-Birch	18	27	44	65	58	4	11	10	9	5	57	72	103	70	65
Northern Pine	6	11	30	38	45	6	7	10	4	1	33	20	23	27	26
Central Hardwood	1	3	1	8	7	2	4	6	4	4	2	2	2	*	1
Prairie	-	-	--	*	*	--	--	--	--	--	*	*	--	1	*
Total	25	42	75	111	109	12	21	26	17	9	92	94	128	97	92
WISCONSIN															
Northeast	146	129	116	123	120	191	209	226	194	152	115	107	121	101	124
Northwest	134	114	126	152	123	150	170	205	172	158	100	108	110	101	83
Central	25	17	18	28	27	55	49	60	59	64	38	77	89	104	90
Southwest	1	1	1	3	3	2	2	4	5	4	1	2	5	6	5
Southeast	*	*	1	2	1	1	2	2	3	2	1	3	5	3	3
Total	307	261	263	309	275	399	431	496	433	379	255	298	329	315	306
Total Lake States	515	500	550	596	641	997	1,083	1,259	1,229	1,165	628	734	845	711	684

* Less than 500 cords.

Table 10.—Pulpwood production from roundwood by Forest Survey Unit, county, and species group, Michigan, 1996

(In standard cords, unpeeled)

Forest Survey Unit and county	All species	Species group: N. white-cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Eastern Upper Peninsula												
Alger	105,051	742	4,131	4,643	6,239	4,624	505	8,064	536	1,989	12,988	1,337
Chippewa	110,838	675	4,952	2,860	17,713	11,155	491	3,890	488	577	30,143	6,276
Delta	124,403	824	5,080	4,343	10,515	7,289	561	4,054	596	1,621	27,884	2,539
Luce	66,370	134	1,163	6,423	8,454	7,216	91	2,513	97	998	8,153	497
Mackinac	96,734	338	2,678	1,105	9,107	3,724	220	2,048	182	1,080	30,063	6,171
Menominee	72,474	562	2,997	2,685	2,889	1,432	454	1,550	406	1,020	22,094	2,043
Schoolcraft	113,618	768	4,054	3,124	17,883	14,396	594	4,410	589	1,039	20,765	1,720
Total	689,489	4,043	25,056	25,183	72,800	49,835	2,916	26,530	2,895	8,325	152,090	20,582
Western Upper Peninsula												
Baraga	102,440	170	1,586	13,792	2,440	1,330	297	3,075	123	1,102	22,505	2,482
Dickinson	108,061	682	5,386	2,905	8,018	3,054	477	8,193	504	388	43,696	2,928
Gogebic	88,396	11	1,930	1,303	236	635	23	1,936	58	1,883	19,395	1,156
Houghton	178,830	202	3,003	3,540	5,362	3,258	182	4,041	312	4,532	35,056	3,761
Iron	196,334	866	10,399	4,311	9,728	7,063	709	12,150	808	1,121	58,310	5,484
Keweenaw	28,320	62	560	1,183	275	168	42	1,689	45	311	2,870	9
Marquette	295,125	1,846	12,029	17,194	38,013	13,086	1,324	11,652	1,335	1,170	75,719	6,911
Ontonagon	219,384	78	2,642	1,376	8,464	1,620	218	7,215	57	9,328	76,051	3,826
Total	1,216,889	3,918	37,535	45,604	72,538	30,213	3,272	49,952	3,241	19,835	333,602	26,556
Northern Lower Peninsula												
Alcona	42,138	--	15	--	5,144	129	49	10	--	775	26,646	1,729
Alpena	33,148	39	354	--	1,814	814	9	114	--	606	20,751	529
Antrim	10,133	1	12	--	173	21	--	3	--	229	3,060	74
Arenac	6,025	--	--	--	39	14	--	--	--	129	4,001	111
Bay	1,450	--	--	--	34	73	--	--	--	--	1,168	--
Benzie	9,680	--	--	--	576	576	--	--	--	316	3,473	118
Charlevoix	4,443	--	--	--	96	21	--	--	--	21	972	5
Cheboygan	53,129	34	294	--	9,446	772	91	156	--	302	27,643	297
Clare	34,661	--	--	--	4,385	586	4	--	--	113	19,771	42
Crawford	71,509	2	11	6	16,670	18,149	605	4	1	155	20,922	224
Emmet	31,213	8	62	--	3,491	315	36	15	--	114	11,202	13
Gladwin	22,085	--	--	--	236	60	--	--	--	105	15,760	218
Grand Traverse	13,548	--	--	--	2,483	2,344	--	--	--	128	4,936	89
Iosco	13,153	--	--	--	655	593	--	--	--	111	8,272	255
Isabella	22,536	--	--	--	199	170	--	--	--	173	13,626	163
Kalkaska	20,702	--	--	56	5,132	1,201	42	--	--	168	7,035	132
Lake	19,284	--	--	--	505	47	--	--	--	934	5,523	347
Leelanau	1,090	--	--	--	--	--	--	--	--	24	714	1
Manistee	27,085	--	--	--	8	24	--	--	--	849	9,849	486
Mason	17,507	--	--	--	--	--	--	--	--	402	8,537	255
Mecosta	27,581	--	--	--	541	733	--	--	--	547	13,847	858
Midland	13,956	--	--	--	22	32	--	--	--	258	7,462	166
Missaukee	29,212	3	16	11	1,662	1,302	2	7	2	253	16,636	260
Montmorency	46,788	--	--	--	5,154	496	43	--	--	1,378	28,079	922
Newaygo	25,490	--	--	--	--	--	--	--	--	437	9,615	522
Oceana	11,034	--	--	--	--	--	--	--	--	208	4,877	250
Ogemaw	28,560	--	--	--	9,432	706	68	--	--	275	11,671	221
Osceola	36,953	--	--	--	77	88	--	--	--	690	17,891	912
Oscoda	28,204	--	--	--	8,070	165	81	--	--	333	13,322	322
Otsego	38,371	--	276	--	2,852	603	22	28	--	376	17,706	64
Presque Isle	49,453	82	1,082	76	5,857	1,644	51	534	10	750	23,247	682
Roscommon	50,994	46	366	--	17,320	1,428	128	87	--	306	18,999	171
Wexford	19,821	--	--	--	2,264	2,289	--	--	--	319	8,361	291
Total	860,937	215	2,488	149	104,336	35,394	1,230	958	14	11,785	405,572	10,729
Southern Lower Peninsula												
Allegan	14,360	--	--	--	--	--	--	--	--	--	3,244	10
Barry	1,130	--	--	--	--	--	--	--	--	--	272	--
Berrien	583	--	--	--	--	--	--	--	--	--	131	--
Branch	2,104	--	--	--	--	--	--	--	--	--	472	--
Calhoun	1,081	--	--	--	--	--	--	--	--	--	236	23
Cass	1,244	--	--	--	--	--	--	--	--	--	279	--
Gratiot	5,884	--	--	--	--	--	--	--	--	130	2,865	204
Huron	20	--	--	--	--	--	--	--	--	--	20	--
Kalamazoo	1,497	--	--	--	--	--	--	--	--	--	429	20
Kent	7,240	38	366	--	--	--	--	87	--	44	2,317	71
Montcalm	8,285	--	--	--	229	--	--	--	--	87	4,388	82
Muskegon	7,514	--	--	--	--	--	--	--	--	--	2,001	--
Ottawa	3,506	--	--	--	--	--	--	--	--	--	1,043	--
Saginaw	33	--	--	--	--	--	--	--	--	--	18	--
Sanilac	1,351	--	--	--	13	130	--	--	--	--	796	--
St Joseph	2,156	--	--	--	--	--	--	--	--	--	470	--
Tuscola	1,246	--	--	--	--	29	--	--	--	--	1,195	--
Van Buren	7,449	--	--	--	--	--	--	--	--	--	1,671	--
Total	66,684	38	366	--	242	159	--	87	--	260	21,848	411
State total	2,833,999	8,214	65,444	70,936	249,916	115,601	7,418	77,527	6,149	40,206	913,112	58,279

(Table 10 continued on next page)

(Table 10 continued)

Forest Survey Unit and county	Species group											
	Bass-wood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwood
Eastern Upper Peninsula												
Alger	1,138	517	10,173	3,274	--	2	--	26,019	16,162	381	--	1,587
Chippewa	548	628	7,216	1,244	--	1	--	9,119	11,998	342	--	522
Delta	1,227	623	12,677	4,073	--	5	--	23,512	15,097	340	--	1,543
Luce	536	253	5,285	1,673	--	1	--	13,058	8,847	190	--	788
Mackinac	828	465	8,454	2,224	--	7	--	14,700	12,216	243	--	880
Menominee	894	251	8,424	2,634	1	4	--	12,996	8,143	198	6	788
Schoolcraft	827	712	7,330	2,490	--	3	--	18,713	12,567	266	--	1,371
Total	5,999	3,448	59,559	17,612	1	24	--	118,118	85,029	1,960	6	7,478
Western Upper Peninsula												
Baraga	2,875	456	8,597	5,181	--	16	--	22,569	11,476	1,418	64	886
Dickinson	1,702	160	7,186	4,668	3	22	--	11,240	5,532	884	34	398
Gogebic	3,628	4	10,613	5,446	16	49	--	25,073	10,761	3,319	273	647
Houghton	10,303	428	16,157	11,375	3	20	--	50,910	21,920	3,235	83	1,148
Iron	4,260	542	15,683	9,826	5	25	--	34,318	16,930	2,460	98	1,237
Keweenaw	1,092	--	3,962	2,765	--	1	--	8,875	3,496	754	6	155
Marquette	3,899	1,880	18,160	10,188	1	18	--	46,937	28,722	2,059	35	2,944
Ontonagon	19,231	28	7,237	7,196	36	16	--	52,347	19,354	2,626	70	368
Total	46,990	3,500	87,596	56,645	64	167	--	252,268	118,190	16,756	664	7,784
Northern Lower Peninsula												
Alcona	196	117	2,212	--	--	--	--	478	4,449	187	--	--
Alpena	131	126	1,596	1	--	3	--	524	5,558	128	30	21
Antrim	297	127	1,011	4	--	18	--	1,558	2,538	714	171	122
Arenac	11	23	495	--	--	1	--	142	975	58	15	10
Bay	--	--	78	--	--	--	--	--	98	--	--	--
Benzie	264	111	594	10	--	28	--	855	1,159	1,136	271	193
Charlevoix	1,304	40	67	--	--	1	--	1,382	467	49	11	7
Cheboygan	782	155	2,071	5	--	2	--	1,096	9,499	446	21	17
Clare	76	40	922	40	--	10	--	2,283	5,515	581	227	68
Crawford	523	227	2,078	37	--	--	--	2,793	6,522	2,555	26	--
Emmet	2,302	209	1,931	1	--	3	--	1,857	9,494	116	28	19
Gladwin	86	17	989	37	--	6	--	948	3,563	22	35	2
Grand Traverse	422	45	574	4	--	11	--	578	1,285	460	110	78
Iosco	74	25	1,108	1	--	4	--	225	1,622	147	35	25
Isabella	52	40	240	--	--	--	--	3,458	4,402	--	13	--
Kalkaska	728	101	513	22	--	11	--	1,491	3,145	735	111	79
Lake	629	330	1,452	24	--	84	--	1,760	2,912	3,362	803	572
Leelanau	27	1	27	--	--	--	--	97	192	6	1	--
Manistee	824	348	1,667	27	--	69	--	3,533	4,218	2,989	1,727	467
Mason	448	325	1,161	20	--	32	--	1,576	2,066	1,453	1,013	220
Mecosta	335	238	262	3	--	10	--	3,605	4,899	620	1,013	70
Midland	167	219	632	6	--	16	--	1,064	2,923	642	243	104
Missaukee	237	149	1,111	8	--	19	--	1,410	4,941	745	319	120
Montmorency	1,574	207	1,657	--	--	--	--	728	6,436	114	--	--
Newaygo	311	307	476	8	--	28	--	4,194	5,958	1,952	1,492	189
Oceana	134	438	400	7	--	11	--	952	1,704	1,044	934	74
Ogemaw	80	58	815	2	--	6	--	538	2,504	1,977	163	42
Osceola	432	486	805	29	--	23	--	4,947	7,278	1,300	1,837	157
Oscoda	352	85	1,297	1	--	2	--	437	2,873	839	16	10
Otsego	3,518	432	1,966	3	--	1	--	3,921	6,349	173	71	10
Presque Isle	104	144	2,092	--	--	--	--	541	12,307	247	1	--
Roscommon	293	149	1,263	6	--	20	--	977	6,089	3,017	193	138
Wexford	415	122	744	11	--	21	--	1,146	2,596	848	253	143
Total	17,128	5,439	34,308	320	--	443	--	51,094	136,534	28,663	11,183	2,955
Southern Lower Peninsula												
Allegan	--	--	--	--	43	--	--	--	3,046	3,853	4,165	--
Barry	--	--	--	--	--	--	--	--	236	299	324	--
Berrien	--	--	--	--	--	--	--	--	125	157	170	--
Branch	--	--	--	--	--	--	--	--	449	568	614	--
Calhoun	--	--	--	--	--	--	--	--	225	285	312	--
Cass	--	--	--	--	--	--	--	--	266	336	363	--
Gratiot	129	--	--	--	64	--	--	1,085	1,407	--	--	--
Huron	--	--	--	--	--	--	--	--	--	--	--	--
Kalamazoo	--	45	--	--	--	--	--	--	245	362	395	--
Kent	2	50	12	--	--	--	--	296	1,288	1,354	1,314	--
Montcalm	--	79	11	--	64	--	--	904	1,461	540	439	--
Muskegon	--	--	--	--	--	--	--	37	1,494	1,956	2,027	--
Ottawa	--	--	--	--	--	--	--	43	666	843	911	--
Saginaw	--	--	--	--	--	--	--	--	--	--	15	--
Sanilac	--	--	96	--	--	--	--	--	316	--	--	--
St Joseph	--	--	--	--	--	--	--	--	447	566	612	61
Tuscola	--	--	--	--	--	--	--	--	22	--	--	--
Van Buren	--	--	--	--	--	--	--	--	1,590	2,012	2,175	--
Total	131	175	119	--	172	--	--	2,366	13,282	13,131	13,837	61
State total	70,249	12,561	181,582	74,577	237	633	--	423,844	353,036	60,509	25,690	18,279

Table 11.—Pulpwood production from roundwood by Forest Survey Unit, county and species group, Minnesota, 1996

(In standard cords, unpeeled)

Forest Survey Unit and county	All species	Species group										
		N. white-cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tama-rack	Ash	Aspen	Balsam poplar
Aspen-Birch												
Carlton	62,764	--	9,009	--	1,408	2,291	11	4,923	--	45	35,843	908
Cook	70,453	--	6,624	--	11,102	1,570	--	31,865	4,505	180	10,234	12
Koochiching	449,402	--	49,801	--	3,432	1,235	12	36,644	4,803	--	313,330	38,805
Lake	101,999	--	15,719	--	1,275	2,030	35	17,193	45	289	48,013	2,966
St Louis	636,636	--	89,959	--	8,641	4,953	321	66,935	1,872	102	408,787	21,255
Total	1,321,254	--	171,113	--	25,858	12,078	379	157,560	11,225	616	816,206	63,946
Northern Pine												
Aitkin	98,469	--	5,583	--	571	2,005	39	1,568	--	--	83,811	1,565
Becker	90,233	--	763	--	1,363	501	--	716	--	--	85,357	377
Beltrami	152,821	--	4,820	--	1,717	1,228	--	1,243	--	631	127,053	8,617
Cass	197,536	--	7,373	--	6,322	6,236	13	940	10	--	164,722	2,274
Clearwater	94,118	--	2,328	--	955	712	30	73	--	176	84,479	1,423
Crow Wing	72,798	--	69	--	6,336	2,371	--	123	--	--	61,346	22
Hubbard	114,752	--	831	--	6,776	2,331	--	599	--	78	97,262	1,152
Itasca	321,012	--	50,539	--	3,840	3,041	106	32,240	2,161	11	209,926	7,647
Lake of the Woods	37,751	--	2,302	--	237	--	--	5,246	78	--	28,981	785
Mahnomen	15,440	--	--	--	74	--	--	--	--	--	15,248	8
Roseau	14,683	--	523	--	272	401	--	1,157	--	--	11,603	721
Wadena	22,088	--	--	--	2,419	1,222	--	48	--	--	18,302	22
Total	1,231,702	--	75,130	--	30,883	20,047	187	43,953	2,250	896	988,090	24,614
Central Hardwood												
Benton	621	--	--	--	--	390	22	--	--	--	208	--
Chisago	7,166	--	--	--	370	4,573	56	443	--	62	1,290	--
Douglas	509	--	--	--	--	--	--	--	--	--	508	1
Goodhue	382	--	--	--	--	--	--	--	--	--	382	--
Isanti	3,790	--	--	--	187	3,573	--	--	--	--	30	--
Kanabec	13,118	--	--	--	--	661	--	--	--	22	11,966	6
Mille Lacs	59,202	--	131	--	--	1,130	--	104	--	--	57,812	24
Morrison	21,867	--	--	--	176	3,813	--	394	--	--	17,352	22
Otter Tail	33,416	--	--	--	32	--	--	--	--	--	33,106	249
Pine	140,689	--	6,072	--	1,166	6,580	34	1,536	--	40	115,688	839
Rice	14	--	--	--	--	14	--	--	--	--	--	--
Sherburne	2,612	--	--	--	27	2,489	32	31	--	--	31	1
Stearns	611	--	--	--	--	--	--	--	--	--	611	--
Todd	7,875	--	--	--	45	53	--	--	--	--	7,743	34
Wabasha	441	--	--	--	--	433	7	--	--	--	--	--
Washington	1,571	--	--	--	273	1,122	99	--	--	9	11	--
Winona	1,550	--	--	--	142	882	--	98	--	63	--	--
Wright	693	--	--	--	--	693	--	--	--	--	--	--
Total	296,127	--	6,203	--	2,418	26,408	252	2,606	--	196	246,738	1,176
Prairie												
Clay	49	--	--	--	--	--	--	--	--	--	49	--
Kittson	8,918	--	11	--	--	--	--	--	--	--	8,902	4
Marshall	10,401	--	--	--	--	--	--	--	--	--	10,109	282
Norman	6,715	--	--	--	--	--	--	--	--	--	6,715	--
Pennington	7,497	--	--	--	--	--	--	--	--	--	7,358	36
Polk	10,819	--	--	--	--	--	--	17	--	--	10,758	34
Red Lake	3,452	--	--	--	--	--	--	--	--	--	3,410	3
Total	47,849	--	11	--	--	--	--	17	--	--	47,300	359
State total	2,896,932	--	252,458	--	59,158	58,534	819	204,136	13,474	1,709	2,098,335	90,095

(Table 11 continued on next page)

(Table 11 continued)

Forest Survey Unit and county	Species group											
	Bass-wood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwood
Aspen-Birch												
Carlton	4	--	7,946	--	--	--	--	189	161	21	--	4
Cook	--	--	4,001	--	--	--	--	60	300	--	--	--
Koochiching	--	--	1,339	--	--	--	--	--	--	--	--	--
Lake	--	--	13,404	--	--	--	--	967	63	1	--	--
St Louis	--	--	31,044	--	--	--	--	1,581	1,186	--	--	--
Total	4	--	57,734	--	--	--	--	2,797	1,710	22	--	4
Northern Pine												
Aitkin	--	--	3,165	--	--	--	--	162	2	--	--	--
Becker	--	--	1,157	--	--	--	--	--	--	--	--	--
Beltrami	--	--	7,514	--	--	--	--	--	--	--	--	--
Cass	--	--	9,645	--	--	--	--	--	--	--	--	--
Clearwater	--	--	3,942	--	--	--	--	--	--	--	--	--
Crow Wing	--	--	2,532	--	--	--	--	--	--	--	--	--
Hubbard	--	--	5,722	--	--	--	--	--	--	--	--	--
Itasca	--	--	10,999	--	--	--	--	228	273	--	--	--
Lake of the Woods	--	--	122	--	--	--	--	--	--	--	--	--
Mahnomen	--	--	111	--	--	--	--	--	--	--	--	--
Roseau	--	--	5	--	--	--	--	--	--	--	--	--
Wadena	--	--	75	--	--	--	--	--	--	--	--	--
Total	--	--	44,988	--	--	--	--	390	275	--	--	--
Central Hardwood												
Benton	--	--	--	--	--	--	--	--	--	--	--	--
Chisago	4	--	210	--	--	--	--	37	97	22	--	4
Douglas	--	--	--	--	--	--	--	--	--	--	--	--
Goodhue	--	--	--	--	--	--	--	--	--	--	--	--
Isanti	--	--	--	--	--	--	--	--	--	--	--	--
Kanabec	--	--	419	--	--	--	--	7	36	--	--	--
Mille Lacs	--	--	--	--	--	--	--	--	--	--	--	--
Morrison	--	--	109	--	--	--	--	--	--	--	--	--
Otter Tail	--	--	29	--	--	--	--	--	--	--	--	--
Pine	4	--	5,496	--	--	--	--	1,626	1,582	22	--	4
Rice	--	--	--	--	--	--	--	--	--	--	--	--
Sherburne	--	--	--	--	--	--	--	--	--	--	--	--
Stearns	--	--	--	--	--	--	--	--	--	--	--	--
Todd	--	--	--	--	--	--	--	--	--	--	--	--
Wabasha	--	--	--	--	--	--	--	--	--	--	--	--
Washington	--	--	35	--	--	--	--	3	17	--	--	--
Winona	--	--	229	--	--	--	--	21	104	8	3	--
Wright	--	--	--	--	--	--	--	--	--	--	--	--
Total	8	--	6,527	--	--	--	--	1,694	1,836	52	3	8
Prairie												
Clay	--	--	--	--	--	--	--	--	--	--	--	--
Kittson	--	--	--	--	--	--	--	--	--	--	--	--
Marshall	--	--	9	--	--	--	--	--	--	--	--	--
Norman	--	--	--	--	--	--	--	--	--	--	--	--
Pennington	--	--	103	--	--	--	--	--	--	--	--	--
Polk	--	--	10	--	--	--	--	--	--	--	--	--
Red Lake	--	--	39	--	--	--	--	--	--	--	--	--
Total	--	--	162	--	--	--	--	--	--	--	--	--
State total	12	--	109,412	--	--	--	--	4,880	3,821	74	3	12

Table 12.—Pulpwood production from roundwood by Forest Survey Unit, county, and species group, Wisconsin, 1996

(In standard cords, unpeeled)

Forest Survey Unit and county[1]	All species	Species group										
		N. white-cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Northeastern												
Florence	78,667	40	2,347	3,490	6,269	5,924	260	1,303	120	2,262	29,616	1,012
Forest	108,263	--	7,087	2,763	1,323	5,246	440	2,909	129	4,243	40,166	917
Langlade	115,718	--	8,567	1,312	628	2,975	393	2,192	306	4,756	48,162	163
Lincoln	135,092	--	4,036	511	2,321	3,922	602	1,508	710	5,165	63,686	99
Marinette	114,173	--	2,886	581	20,433	16,336	1,196	1,404	296	1,890	44,228	1,547
Menominee	81,895	384	2,107	10,063	4,565	6,660	1,925	858	278	2,486	26,811	329
Oconto	52,453	--	487	409	3,828	6,088	376	604	--	1,208	23,765	379
Oneida	149,884	--	8,930	595	5,781	11,259	2,261	3,531	2,700	5,554	44,905	358
Shawano	31,981	--	224	778	110	3,238	219	133	264	1,228	13,956	1
Vilas	134,687	--	4,180	295	27,105	13,610	2,237	1,203	127	4,097	31,507	198
Total	1,002,814	423	40,852	20,798	72,364	75,258	9,908	15,646	4,930	32,889	366,803	5,001
Northwestern												
Ashland	72,410	--	3,640	220	714	2,196	939	2,748	319	2,542	35,806	34
Barron	27,330	--	14	--	363	900	372	255	--	478	19,710	4
Bayfield	170,989	--	4,055	160	45,061	7,404	957	1,250	32	3,387	67,349	21
Burnett	67,254	--	37	--	21,573	10,696	248	451	152	763	25,667	2
Douglas	184,260	--	23,675	--	40,970	16,916	649	4,991	274	1,180	65,181	147
Iron	134,907	3	7,154	631	638	1,436	376	2,143	147	4,524	73,075	56
Polk	43,720	--	19	22	12,176	2,677	133	22	29	539	22,202	3
Price	121,267	--	4,219	150	4,285	3,351	624	2,513	2,078	4,312	55,276	79
Rusk	63,954	--	287	32	193	1,180	211	470	182	3,210	27,526	16
Sawyer	145,460	--	3,506	204	2,498	6,766	970	2,585	213	5,027	64,508	7
Taylor	69,458	--	2,435	1,313	32	1,047	100	393	372	2,561	35,746	22
Washburn	109,073	--	1,435	17	30,460	11,321	583	272	845	1,341	46,548	4
Total	1,210,081	3	50,474	2,750	158,962	65,889	6,161	18,093	4,643	29,865	538,594	396
Central												
Adams	79,505	--	20	--	28,748	30,966	2,677	10	6	223	6,363	1
Chippewa	30,315	--	36	103	50	1,947	120	15	170	589	20,127	4
Clark	105,422	--	1	96	5,666	3,889	1,159	25	67	3,272	51,375	14
Eau Claire	31,956	--	--	--	4,513	5,119	399	16	--	810	10,354	1
Jackson	83,679	--	126	43	24,810	10,004	2,474	160	30	2,304	15,101	1
Juneau	57,663	--	--	--	22,161	12,844	1,801	4	--	564	3,036	2
Marathon	54,704	--	281	791	1,344	4,681	741	196	--	2,438	21,302	11
Marquette	12,558	--	--	--	722	9,075	1,169	--	--	93	304	1
Monroe	31,804	--	--	--	11,610	4,747	1,463	--	100	495	4,755	2
Portage	42,997	--	37	388	7,464	16,364	1,294	156	169	528	9,387	5
Waupaca	17,723	--	--	112	178	6,083	627	25	--	558	5,327	2
Waushara	28,590	--	1	14	1,113	21,678	2,330	43	12	148	1,067	1
Wood	40,756	--	--	13	5,116	5,368	1,608	239	--	469	21,037	1
Total	617,671	--	503	1,558	113,496	132,763	17,862	889	554	12,492	169,534	46
Southwestern												
Buffalo	6,505	--	--	--	18	484	327	60	--	85	4,756	1
Crawford	990	--	--	--	--	492	132	22	--	7	67	1
Dunn	18,159	--	--	--	1,156	6,873	986	66	--	332	5,222	1
Grant	2,575	--	--	--	11	2,072	119	--	--	17	23	--
Iowa	3,354	--	--	--	1,142	1,397	203	66	6	5	269	--
La Crosse	4,630	--	--	--	1,208	2,059	227	--	--	66	389	--
Lafayette	13	--	--	--	--	--	--	--	--	1	--	--
Pepin	3,261	--	--	--	153	143	359	156	--	123	1,337	1
Pierce	1,499	--	--	--	--	195	179	38	--	15	849	1
Richland	2,181	--	--	--	623	1,173	273	5	--	1	21	--
Sauk	9,568	--	3	--	1,707	4,290	809	47	--	163	337	1
St Croix	9,641	--	--	--	166	960	143	251	--	17	7,612	--
Trempealeau	12,137	--	--	--	73	7,053	819	--	--	165	2,734	1
Vernon	823	--	--	--	14	676	59	--	--	5	--	--
Total	75,334	--	3	--	6,271	27,867	4,636	710	6	1,001	23,615	7
Southeastern												
Brown	11,083	--	--	--	36	1,403	22	22	--	76	8,243	905
Calumet	21	--	--	--	--	--	--	--	--	3	--	--
Columbia	7,227	--	32	--	509	4,771	473	131	--	40	108	--
Dane	557	--	--	--	15	168	175	13	--	17	--	--
Dodge	46	--	--	--	--	--	--	--	--	--	25	--
Door	3,788	--	105	11	--	480	699	383	--	28	883	--
Fond Du Lac	468	--	--	--	--	38	34	--	--	12	82	--
Green	355	--	--	--	31	231	84	--	--	--	--	--
Green Lake	2,742	--	--	--	67	1,467	553	50	--	7	89	1
Jefferson	1,259	--	--	--	20	613	600	15	--	1	--	--
Kenosha	24	--	--	--	--	--	24	--	--	--	--	--
Kewaunee	126	--	--	--	--	85	28	--	--	2	--	--
Manitowoc	1,419	--	15	14	233	854	112	98	--	12	--	--
Milwaukee	29	--	--	14	--	16	--	--	--	--	--	--
Outagamie	3,858	--	--	11	--	957	250	104	--	163	1,085	1
Ozaukee	28	--	--	--	--	--	28	--	--	--	--	--
Racine	508	--	--	--	117	--	173	206	--	1	--	--
Rock	1,513	--	16	--	25	1,159	276	38	--	--	--	--
Sheboygan	644	--	30	--	--	349	44	25	--	1	131	1
Walworth	2,190	--	--	--	--	1,365	724	39	64	--	--	--
Washington	566	--	--	29	--	39	206	66	--	24	28	--
Waukesha	972	--	--	--	27	495	302	96	--	6	--	--
Winnebago	86	--	--	--	--	30	44	--	--	--	--	--
Total	39,508	--	197	79	1,077	14,519	4,852	1,284	64	395	10,675	908
State total	2,945,409	427	92,028	25,184	352,170	316,296	43,419	36,623	10,197	76,641	1,109,221	6,358

(Table 12 continued on next page)

(Table 12 continued)

Forest Survey Unit and county[1]	Species group											
	Bass-wood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwood
Northeastern												
Florence	2,619	8	8,467	1,865	11	217	--	5,858	3,921	2,712	229	117
Forest	2,259	91	11,586	2,155	22	2,823	--	11,456	9,143	2,516	819	169
Langlade	2,823	66	12,320	1,871	46	2,150	--	13,109	10,246	2,376	1,065	191
Lincoln	5,413	156	11,396	1,629	99	4,766	--	12,738	10,114	4,858	552	811
Marinette	2,222	--	8,009	1,868	3	21	--	4,815	3,291	2,767	276	104
Menominee	213	247	2,102	1,256	1	2,420	--	9,308	9,082	404	133	262
Oconto	1,723	9	5,117	1,233	11	272	--	3,050	2,099	1,629	95	70
Oneida	9,707	12	21,101	2,168	192	524	--	13,030	8,025	7,024	870	1,356
Shawano	109	41	2,012	391	1	1,247	--	3,774	3,689	404	150	12
Vilas	3,870	5	21,486	1,893	57	243	--	9,568	5,849	5,558	687	911
Total	30,958	635	103,597	16,329	443	14,684	--	86,706	65,460	30,249	4,877	4,004
Northwestern												
Ashland	581	3	6,836	559	6	197	79	7,116	5,929	1,224	609	113
Barron	251	--	1,510	36	4	8	--	1,378	1,162	675	128	81
Bayfield	892	--	17,975	539	10	124	--	9,831	7,906	2,812	977	248
Burnett	238	--	2,420	131	2	34	--	2,009	1,583	898	259	90
Douglas	153	--	17,339	191	1	34	--	7,082	4,656	554	205	62
Iron	4,392	79	11,198	1,520	54	2,463	--	11,140	7,893	4,913	447	624
Polk	198	--	2,120	70	3	17	--	1,209	1,670	443	101	65
Price	4,138	21	12,572	690	79	742	--	11,889	9,101	3,770	714	666
Rusk	1,541	12	8,281	609	225	682	--	9,249	7,458	1,692	721	176
Sawyer	881	13	24,026	1,010	7	603	--	15,196	13,581	2,428	1,239	193
Taylor	1,394	57	7,028	688	60	1,834	--	6,878	5,169	1,589	530	209
Washburn	313	3	5,846	172	3	126	--	4,052	4,537	848	241	105
Total	14,971	188	117,152	6,215	453	6,866	79	87,030	70,645	21,848	6,171	2,632
Central												
Adams	98	--	375	6	1	1	--	531	357	7,633	1,423	65
Chippewa	536	--	2,130	139	118	137	--	1,794	1,327	697	205	72
Clark	1,093	22	8,454	607	33	778	564	8,839	7,292	8,958	2,945	273
Eau Claire	223	1	1,935	114	1	55	--	2,140	1,494	3,656	1,003	120
Jackson	382	--	3,847	181	1	42	--	7,198	6,017	8,750	1,966	243
Juneau	178	--	1,129	69	2	20	--	1,524	1,096	11,036	2,110	87
Marathon	615	104	3,194	814	11	3,167	--	6,799	6,071	1,514	552	80
Marquette	57	--	183	12	1	2	--	227	153	417	123	20
Monroe	193	--	836	26	2	6	--	1,341	1,011	4,166	946	104
Portage	273	8	841	155	5	265	--	1,509	1,294	2,120	717	19
Waupaca	173	17	645	140	2	508	--	1,363	1,127	644	103	89
Waushara	78	--	277	23	1	18	--	388	289	796	291	24
Wood	93	--	1,113	92	1	25	--	1,395	1,053	2,468	649	19
Total	3,993	152	24,958	2,377	179	5,024	564	35,048	28,580	52,853	13,032	1,216
Southwestern												
Buffalo	49	--	192	10	1	2	--	208	133	139	21	18
Crawford	29	--	13	--	1	--	--	13	7	155	48	3
Dunn	111	1	1,242	55	1	29	--	836	568	504	126	51
Grant	6	--	40	5	--	5	--	48	33	146	50	1
Iowa	1	--	14	1	--	--	--	16	10	173	51	--
La Crosse	44	--	113	--	--	--	--	122	58	269	46	27
Lafayette	--	--	3	--	--	--	--	4	3	1	--	--
Pepin	73	--	267	4	1	1	--	242	122	227	5	45
Pierce	34	--	94	1	1	4	--	31	21	29	--	7
Richland	2	--	1	--	--	--	--	1	1	60	20	--
Sauk	79	--	309	10	1	2	--	378	235	947	203	46
St Croix	3	--	304	3	--	1	--	46	106	23	6	2
Trempealeau	85	--	303	5	1	1	--	329	168	326	13	61
Vernon	2	--	9	--	--	--	--	9	4	37	6	2
Total	519	1	2,903	96	7	45	--	2,282	1,471	3,037	595	263
Southeastern												
Brown	208	--	16	3	1	1	--	31	94	8	9	3
Calumet	1	--	4	--	--	--	--	5	2	5	--	1
Columbia	4	--	71	7	--	1	--	122	104	595	254	2
Dane	7	--	29	--	--	--	--	34	19	67	6	7
Dodge	--	--	--	--	--	--	--	--	--	16	5	--
Door	28	--	808	201	--	--	--	72	53	35	--	1
Fond Du Lac	1	--	27	3	--	1	--	33	24	158	54	--
Green	--	--	--	--	--	--	--	--	--	7	2	--
Green Lake	26	--	19	2	1	--	--	21	15	311	112	1
Jefferson	--	--	--	--	--	--	--	4	4	--	--	--
Kenosha	--	--	1	--	--	--	--	--	--	--	--	--
Kewaunee	--	--	1	1	--	--	--	4	5	--	--	--
Manitowoc	--	--	5	4	--	--	--	34	39	--	--	--
Milwaukee	--	--	--	--	--	--	--	--	--	--	--	--
Outagamie	30	--	136	52	1	5	--	497	522	34	8	2
Ozaukee	--	--	--	--	--	--	--	--	--	--	--	--
Racine	--	--	1	1	--	--	--	4	5	--	--	--
Rock	--	--	--	--	--	--	--	--	--	--	--	--
Sheboygan	52	--	1	--	1	--	--	4	4	--	--	1
Walworth	--	--	--	--	--	--	--	--	--	--	--	--
Washington	1	--	16	8	--	--	--	68	73	6	--	1
Waukesha	--	--	3	3	--	--	--	19	21	--	--	--
Winnebago	--	--	--	--	--	--	--	--	--	8	3	--
Total	359	--	1,137	285	4	8	--	953	986	1,252	454	19
State total	50,800	976	249,747	25,302	1,086	26,627	643	212,019	167,141	109,239	25,130	8,135

[1] Includes only those counties that supplied pulpwood in 1996.

Table 13.—Central States pulpwood production by State and destination, 1992-1996

(In thousand standard cords, unpeeled)

	Illinois			Indiana			Iowa			Missouri		
		Destination			Destination			Destination			Destination	
Year	Total	Central States	Other States	Total	Central States	Other States	Total	Central States	Other States	Total	Central States	Other States
1992	77	33	44	150	49	101	12	12	--	116	22	94
1993	55	25	30	143	47	96	13	13	--	78	13	65
1994	76	33	43	147	51	96	22	22	*	88	19	69
1995	81	33	48	310	212	98	23	22	2	113	12	101
1996	95	53	41	149	44	105	23	22	1	126	11	115

* Less than 500 standard cords.

Table 14.—Trends in receipts or roundwood and residue as pulpwood, Central States, 1992-1996

(In thousand standard cords, unpeeled)

Type of material and State	1992	1993	1994	1995	1996
Roundwood					
Indiana, Iowa, Missouri	33	28	42	54	62
Residue					
Indiana, Iowa, Missouri	83	71	86	243	70
All material	116	99	127	297	132

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Lake States pulpwood production decreased 1 percent—from 9.6 million cords in 1995 to 9.5 million cords in 1996. Central States pulpwood production decreased 26 percent—from 528 thousand cords in 1995 to 393 thousand cords in 1996. Plains States pulpwood production was 110 thousand cords, a decrease of 4 percent from 1995. Pulpwood production is shown by county and species group for Michigan, Minnesota, Wisconsin.

KEY WORDS: Roundwood, whole-tree chips, residue, pulpwood, particleboard, Michigan, Minnesota, Wisconsin, Illinois, Indiana, Iowa, Missouri, Plains States.

Our job at the North Central Forest Experiment Station is discovering and creating new knowledge and technology in the field of natural resources and conveying this information to the people who can use it. As a new generation of forests emerges in our region, managers are confronted with two unique challenges: (1) Dealing with the great diversity in composition, quality, and ownership of the forests, and (2) Reconciling the conflicting demands of the people who use them. Helping the forest manager meet these challenges while protecting the environment is what research at North Central is all about.